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THE AUTOMOBILE

INDIANAPOLIS SPEEDWAY IS READY

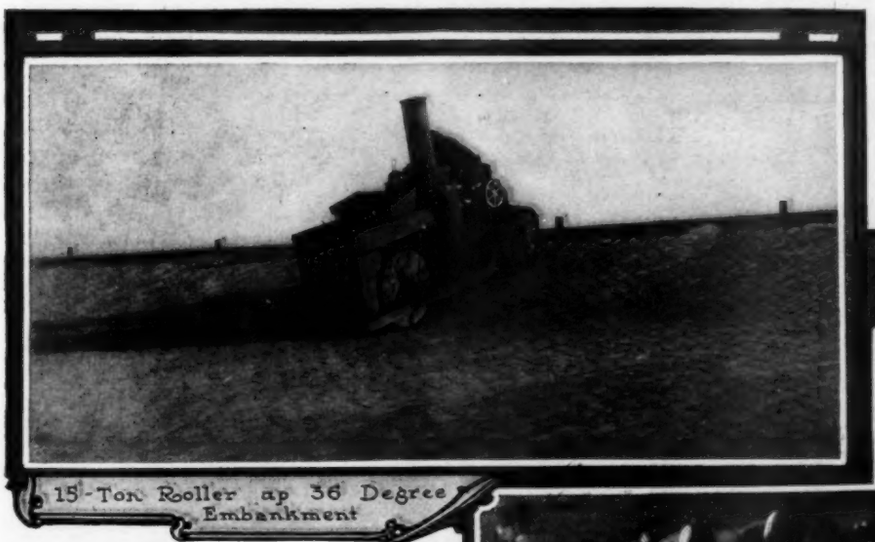
BY THOS. J. FAY

INDIANAPOLIS, IND., Dec. 14—With every brick laid except one, the Indianapolis Motor Speedway awaits its official reopening on Friday and Saturday of this week. This missing brick is a gold-plated one weighing 52 pounds and valued at $500. Of course it will be watched until the conclusion of the meet, after which its future resting place will be decided upon. Drivers of international repute will participate in the competition and time trials, and it is anticipated that many new records will be established during the two-day meet, provided the winter weather conditions are not unnecessarily severe. All who are connected with the enterprise are most enthusiastic and good records are promised.

The earlier speeding attempts on the Indianapolis track proved that after a certain velocity is attained, cars, unless they are almost unbreakable, will give way under work they are required to do, even when the road is better than the standard set for ordinary road building. On account of the unfortunate accidents that befell some of the racing automobiles during the opening meeting held at the speedway, which opened August 19 last, it was decided that nothing but the best possible pavement could be accepted, and the work of brick-paving has been under way ever since, culminating in the most perfect track possible to design and build, the dimensions being as in Fig. 1.

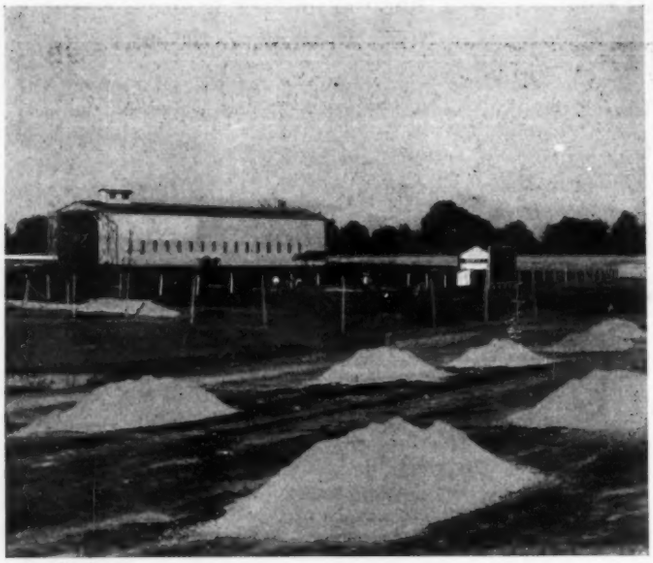
Brick Pavement Finally Decided Upon—That the original track, so well constructed as it proved to be, will serve as a most capable "base fill" is conceded by all the road engineers who were consulted before the work of brick-paving was undertaken. The resurfacing, which was necessary, was well executed, as indicated in the statement here afforded as prepared by Park Taliaferro Andrews, holding the official position of chief engineer of the speedway. The engineer's resumé was gotten out by Mr. Andrews especially for THE AUTOMOBILE, and the author, having gone carefully over the whole work, is able to accept the engineer's resumé in the light of a most guarded statement of actual fact, to which nothing of value can be added.

The life of this brick-paved track, however, is as yet to be determined, and this phase of the problem, while it may be regarded as well looked into, must be to some extent considered within speculative confines and entitled to a little discussion at this time. That there is nothing new about brick may be readily shown; they were used in the Tower of Babel; about this time, so it is recorded, they were also made by the children of Israel, in Egypt, under the Pharaoh. To indicate, however, the uncertain history of this industry, it is only necessary to point out that pottery, which is akin to brick, was a product of cave-dwellers of the drift period from the Neolithic.



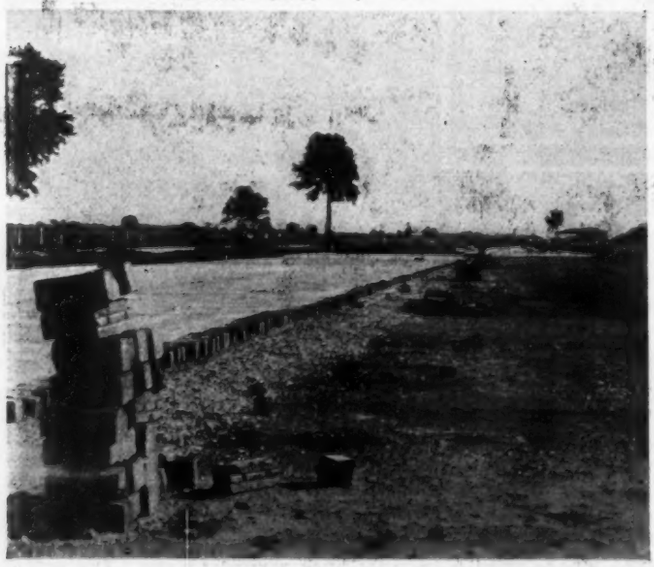
15-Ton Roller up 36 Degree Embankment

Belt Conveyor in Process of Laying Pavers



Crushed Surface Rock Ready to Spread on Old Track

Rolling Crushed Stone on Top of Old Track Surface



First Sample of Brick Surface Laid at Motor Speedway

Modern brick were first used, according to the most authentic sources of information, at Suffolk, in England, in the year 1260. In a hundred years from this time they were of fairly good manufacture, and in 1660 were in quite common use in London.

First Brick Kiln in America—At Salem, Mass., in 1629, the first brick kiln was probably established, although for many years nearly all brick used in this country came from Holland or England. Paving brick, which are of recent origin, were first used in this country in 1870, as nearly as present sources of information can be relied upon.

Process of Manufacture Defined—In the manufacture of paving brick there are many points to consider that do not have to be taken into account in connection with the manufacture of brick for building. From a suitable deposit of clay or shale the material is selected with the greatest care, crushed in dry pans or milled in solid rolls, they being about 48 inches in diameter and one foot wide. The rolls revolve within a revolving pan as much as 108 inches in diameter, the same being provided with a grated bottom. For a large-sized brick machine, two such pans are required, and the amount of shale crushed per hour lies between five and ten cubic yards; about two cubic yards of material is required per thousand of brick.

The crushed material is screened in a process involving fixed and shaking riddles, and knockers are employed to prevent the wet clay from sticking. From the screening process with its attending difficulties, which will not be discussed here, the clay goes to the "pugging" process, where the screened material is rendered plastic in form by suitable additions of water during the process of working in a properly contrived pug-mill. Pugging must be thoroughly done to remove air-enclosures, secure homogeneosity and reduce laminations to a minimum.

When the clay is well crushed, tempered and worked, which for the best results is frequently done by the wet-pan process, moulding follows. In moulding there is the "stiff-mould" process, which seems to be the more promising, despite frequent attempts to apply the dry-press system. A continuous working auger in the stiff-mud process forces the mud through forming dies, when the bar is sanded to prevent the brick from sticking together in the kilne. The bars, as they emerge from the forming dies, are cut to the required length, and a machine, under well-working conditions, is good for 100,000 bricks per day.

The repressing process, when it is applied, consists in putting freshly made stiff-mud brick into a die-box and subjecting it to a heavy vertical pressure, applied, as a rule, to the flat side. This process has the virtue of filling out the angles and edges, making the brick much more dense and uniform.

Drying is done by placing the brick on cars in a checkerwork fashion as high as possible within the sustaining ability of the stiff-mud condition of the brick to be dried, and the cars, so loaded, are run into drying chambers.

Burning, disregarding for the time the quality of material, is the most important process, for no matter how good the work may be done up to this process, No. 1 paving brick can only be the result of proper burning, and it is just here that the skill of the expert counts for everything. Burning usually takes place in from seven to ten days, and as to temperature, a shale brick requires from 1,500 to 2,000 degrees Fahrenheit, while brick made of fire clay demands from 1,800 to 2,300 degrees Fahrenheit.

Annealing follows, after the vitrifying temperature has been maintained for a sufficiently long time to heat the brick through to the center, which annealing is done by closing the kilns and allowing the brick to cool very slowly. For No. 1 brick, annealing should take from seven to ten days. Sorting follows after annealing, and in a properly processed batch of brick it is possible to realize fully 90 per cent. of No. 1 pavers. In this sorting, owing to many difficulties, mistakes are likely, and in the selection of paving brick for a job such as this, it is necessary to exercise the greatest care.

Engineers Had Many Difficulties to Guard Against—While the history of brick making is that of the human race, almost, even so, in view of the uncertainties involved, the selection and use of over 500 carloads of paving brick for this job represented

a deal of painstaking labor, which involved divers precise detailed operations, some of which, however, was avoided, on this occasion, due to the care exercised in the earlier effort dating before it was decided to pave the course.

Methods Employed During the Whole Process—The course is two and one-half miles, being 50 feet wide on the straight stretches and 60 feet wide on the curves. The home-stretch and back-stretch 3,301 feet long, the end straights being 660 feet long, and each of the banked turns being 1,320 feet long on the course line. The curves are each 1-4 of a circle of 840 feet radius on the course line, or 90° of a 6° 49′ 30″ curve. No easement curves or spirals were used.

The curves are banked to an angle of 16° 40″ in cross-section for 50 feet of their width, the remaining 10 feet of width being banked to an angle of 36° 40″, all, as shown in Figs. 2 and 3. The approaches and releases to and from the banked curves are limited to a 2 per cent. grade in sections parallel with the measured course line, and the maximum variation from a level plane at the course line is a 2-10 per cent. grade. The straight stretches are given a pitch of 8-10 feet in 50 feet toward the infield for drainage, thus presenting a fine flat track for the cars.

Cleaning up the Completed Surface

Base Fill Was Thoroughly Rolled—With a 15-ton three-wheel steam roller the whole course was resurfaced and rerolled until the surface presented a smooth, firm and uniform plane. Two inches of creek gravel was then spread uniformly over the entire surface and rolled with the 15-ton roller. This was followed by a 2-inch layer of crushed limestone (rolled with 8-ton tandem roller), over which was poured two gallons of taroid to the square yard; this surface was then overcast with 1-2-inch crushed stone chips, filling the voids between the larger-size stone, and given another coat of taroid (of a lower melting point than the first coat), 8-10 gallon to the square yard being used in the second coat. Over this was spread a thin layer of crushed stone from 1-2-inch to dust in size, and given a final rolling with a 3-ton tandem steam roller.

This surface, which represented the original idea, did not prove to be satisfactory, and the idea of paving over this surface with brick is the matter with which we are now concerned. In proceeding with the brick paving it was decided to accept the No. 1 specifications of the National Paving Brick Manufacturers' Association, and 3,200,000 pressed paving brick were ordered from the Wabash Clay Company for the purpose.

The association, realizing the opportunity for a practical demonstration of brick as a paving material, has collaborated with the engineers of the speedway company, and has furnished two of its ablest men, viz.: W. T. Blackburn, of Paris, Ill., and C. G. Moore, of Cleveland, O. These men have acted as inspectors and advisory engineers.

The pavement has been carefully inspected as it progressed, every square yard of its surface being covered with a 12-foot straight edge, and any variation exceeding 3-8 inch in the 12-foot length removed before the grout was applied to the brick. Along each side of the straight stretches and around the inside of each curve a 5″ x 24″ concrete curb was placed, the top being flush with the surface of the pavement, and a 1″ expansion joint being provided between the pavement and the curb. No transverse expansion joints were used. At the outside of the pavement on each of the banked curves, and in front of the main grand stand, a 9-inch reinforced concrete wall 33 inches above the track surface has been built.

Two reinforced concrete bridges were built to support the track over a stream running diagonally across the southwest corner of the grounds. These bridges are 30 feet wide and 90 feet long, of a permanent character, located as shown in Fig. 1.

Drainage Regarded as Extremely Important—14.3 miles of tile have been laid to drain the grounds, the water which falls on the track being taken care of by a surface drainage system with flush gratings placed equidistant and three feet from the inside of the track. Agriculture drains have been used to care for the ground water.

Methods Employed in the Big Undertaking—The owners have conducted nearly all of the work themselves, only two contracts being entered into, one of which was rescinded owing to the contractor's failure to prosecute the work. The earth work, grading and forming the base fills, etc., was contracted by the C. C. King Bros. & Son Company, who used two outfits of the Western Elevating Grader drawn by traction engines, loading bottom-dump wagons.

As an auxiliary to these outfits, two gangs of wheeled scrapers were used, and between 2,000 and 3,000 yards of average cut and fill was moved daily by this means, the contractors completing their work within the time limit of 60 days in a satisfactory manner. A contract was also entered into for a portion of the brick paving, but the owners were forced to rescind and prosecute the work themselves.

Over 500 carloads of brick were required for paving and in the cement filler between the brick, and the concrete work incident to the track over 80 carloads of cement were used, 53 being used for the grout filler in the brick pavement alone. The entire brick paving of the track was completed in 63 consecutive calen-

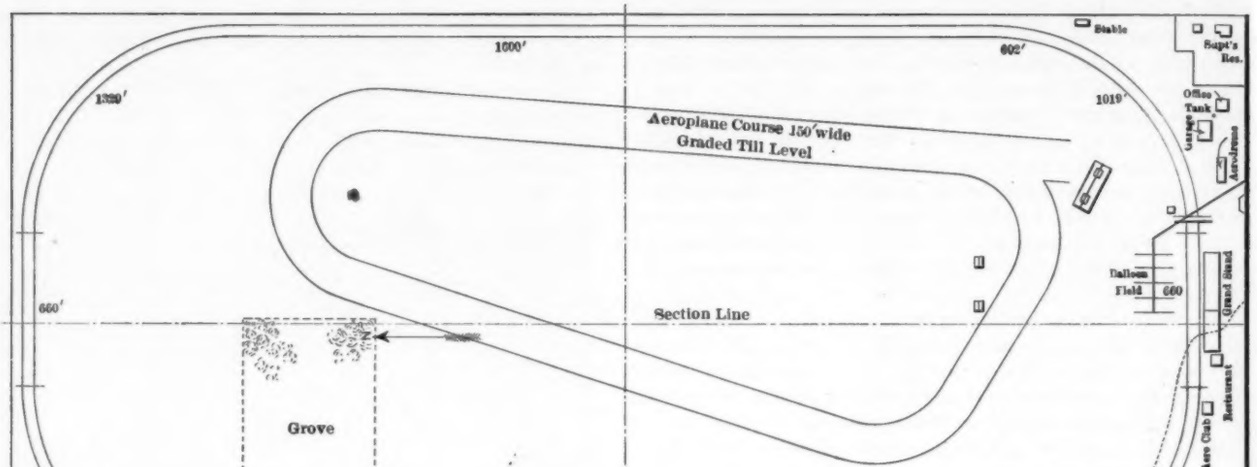


Fig. 1—Plan of speedway, showing present track, location of bridges, buildings in place, and other details

dar days; the biggest single day's work of laying the brick was 140,000 brick laid in nine hours. These brick weigh a trifle less than 10 pounds each, and lie in the pavement 37 to the square yard.

A portable belt conveyor was used for carrying the brick from the piles along the track to the setters; it was mounted on wheels to aid in handling, and was advanced along the pavement following the brick setters at about 10-foot intervals, and was run by an automobile engine.

The brick were piled along the track in piles 10 brick wide, so that a clamp holding five brick would adjust itself to the pile without rehandling the brick. From the pile they were lifted in clamps and placed on the conveyor and removed by clamps and placed where required by the setters, and by this method it was found that one man averaged 11.4 tons of brick from the piles to the pavement in nine hours.

Before laying the brick a two-inch sand cushion was spread over the old track surface and luted to an absolute place surface by a drag working on wooden strips, which were set to grade. On this cushion the brick were laid. A three-ton tandem steam roller then rolled them to a true surface, and the pavement was then subjected to an inspection for grade and plane.

The filler was then applied; it was composed of equal parts of sand and portland cement mixed by hand in special boxes to the consistency of a thin batter and removed from the boxes to the pavement with a 14-inch scoop shovel, but no dump boxes were used for this work.

In order that the joints between the brick be filled absolutely flush with the surface of the brick, a second coat of the filler was applied about one hour after the first coat; this second coat was not broomed off, as the first coat was, but was floated ahead at an angle of 45 degrees with the joints in the brick with a "squeegee" having a rubber face very much like the rubber-faced window cleaners in common use.

Buildings, Lighting Plant and Aviation—The main grand stand is a covered structure 82 feet wide and 500 feet long, and there are two bleachers, one 500 feet by 60 feet and one 350 feet by 65 feet.

An aerodrome 300 x 50 and 35 feet from floor to ceiling is arranged with sliding doors forming one entire end of the structure, which has a truss roof. In addition, there are 42 other buildings, comprising office, superintendent's residence, stables, garages, cafés, clubhouses, rest rooms, etc.

Three miles of tight board fence eight feet high, surmounted with barb wire, surround the grounds, the posts being set in concrete. There are seven miles of wire fence in the infield and around the track, and 1 1-2 miles of eight-foot picket fence. Two suspension bridges for foot traffic cross the track, giving egress

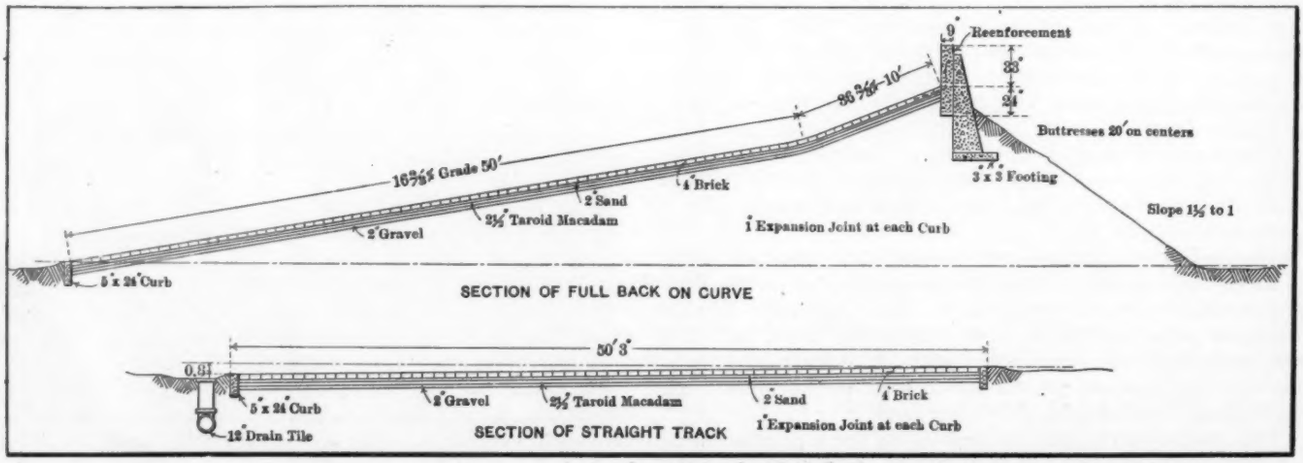


Fig. 2—Detail of embankments, showing buttresses, slope, reinforcement, and other details of construction

from the infield during the races. A truss bridge for vehicles affords entrance and exit to and from the infield during races.

The generators, gas holders, fittings, reflectors, etc., for a night lighting of the entire track at intervals of every 20 feet have been purchased and are on the grounds, and work will be started on their installation as soon as the speeed trials have been run.

An inner course for aeroplanes 150 feet wide and 1 1-2 miles in length is being graded and rolled in the infield to a uniform plane; this will permit an aeroplane to alight at any point in its course and reascend without danger of straining the machine.

Warner Timing Equipment Provided—An automatic timing device was installed by the Warner Autometer Company, which registers in the judges' stand the exact instant at which the tires touch a small hose stretched across the track, serving for the time-honored "tape." In addition to provisions for properly recording time, as the instrument above named, every provision is made to handle the spectators, so that, non-interference with the events will be assured.

Other Uses to Which the Track Will be Put—One of the prime objects of this Speedway is to afford, to the builders of automobiles, at Indianapolis, and in the vicinity, a place to try out new models before they are turned over to purchasers, thus assuring that they will be properly tuned up and so timed that the best possible results will be realized. Advanced models, prior to building in quantity, may also be given the hardest kind of service, within the shortest possible time, and it is the reasonable expectation of the companies at Indianapolis that the track will be of the greatest service, to the makers of cars, and the users as well. That the track will pay interest on the whole investment, is practically assured from the start. The arrangements, from the point of view of policing, are all that can be desired; there is no occasion for anyone crossing the track, and as to accidents, there should be none.

TEXAS ENDURANCE RUN BREAKS RECORDS

Ft. Worth, Tex., Dec. 8—In the recent endurance run from Dallas to San Angelo and return, a distance of nearly 800 miles, all records were broken, not for speed but for mud-plugging. Of the nine cars, and a pilot car, which started from Dallas on Monday morning, but six were left at the second night control, Abilene. Between that point and the finish, another car was eliminated by the fearful road conditions.

In the original program the finish had been planned for Ft. Worth Friday afternoon, but Jupiter Pluvius planned otherwise, and as a result of the week-long downpour a whole day was added and the race finished late Saturday night.

After the technical examination, which kept the committee busy all day Sunday, the winners were announced as follows:

Moline, J. A. Wickes, driver, endurance cup.

Auburn, "Skeet" Hall, driver, economy cup.

Fisk tires, tire cup.

This run was organized and managed by the Ft. Worth *Star-Telegram*. As an endurance run, it was easily the feature event of the year, for the hub-deep mud from one end of the route to the other made even hardened drivers who had been through the Glidden and similar tours get out and work as they had never worked before. Wickes, who drove the Moline, is the same one who took a car of this make through the Glidden. Goldthwaite, who drove a Maxwell, and Illingworth at the wheel of another Maxwell, are both Glidden tour drivers. All three expressed the opinion that the first three days' work of this tour were far harder on both men and cars than the whole two weeks of the Glidden just past. All who witnessed the event, agree that it was conducted in a most painstaking way and that the promoters had the right idea in relation to the mapping out of the course and the management of the details.

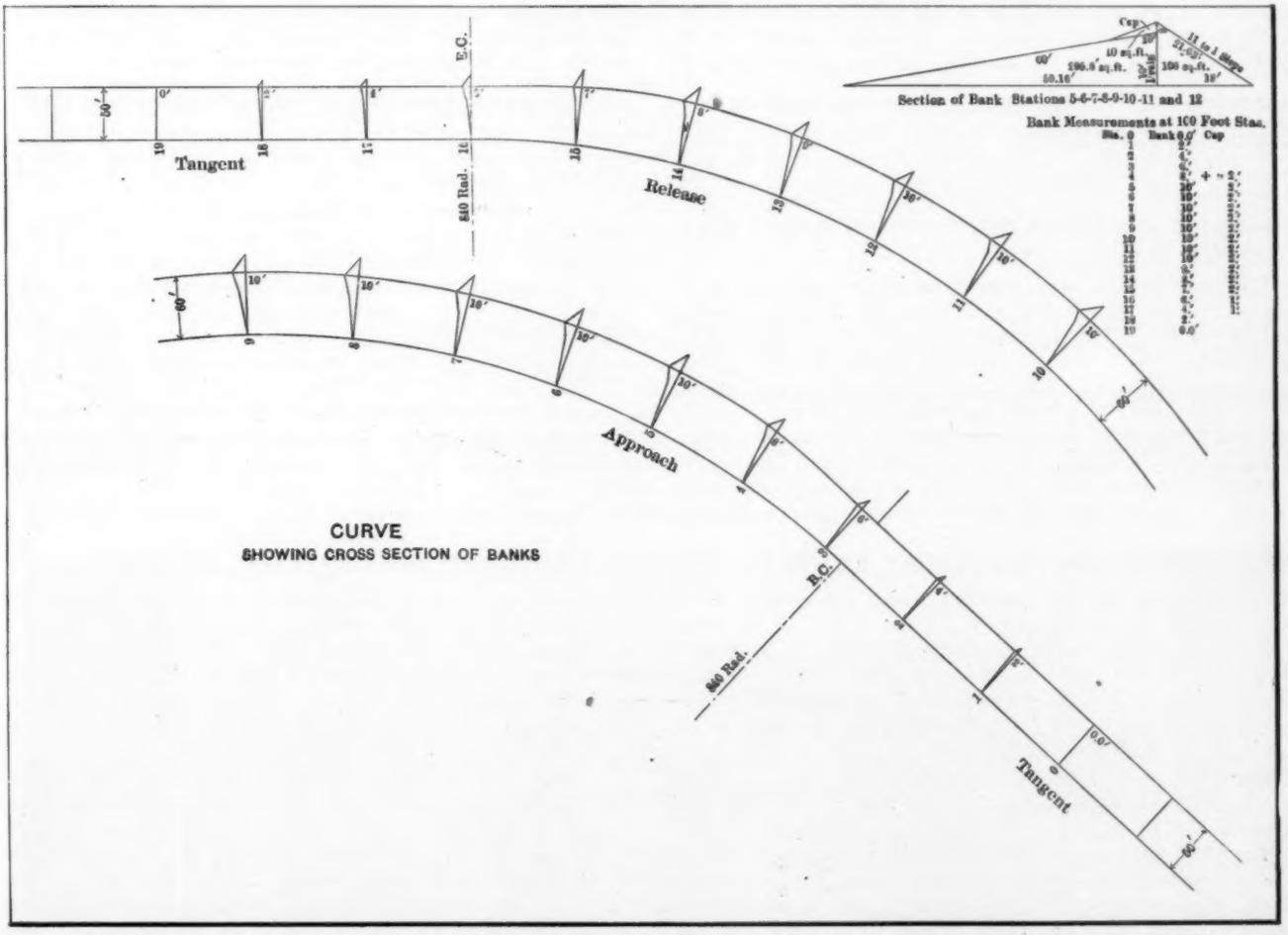


Fig. 3—Detail of curve, there being four, and banking measurements at 100-foot stations, also tangents as connected

Kincaid in National Winning in His Class

Robertson Driving Simplex—Twice a Winner

POSTPONED FORT LEE CLIMB SUCCESSFULLY RUN OFF

FINAL events of the Edgewater-Fort Lee hill-climb on the Palisades, opposite New York City, which were postponed from December 4 on account of the interference of the spectators, were run off last Friday afternoon in the presence of a smaller and more orderly crowd. The conclusion failed to receive the amount of free advertising that the start did, and as a result, many people in New York heard nothing of it. The day, too, Friday instead of Saturday, tended to diminish the attendance

George Robertson, in his Simplex, made the best time, setting a record of 53 2-5 seconds, some three seconds less than Kincaid's mark in the December 4 session. In addition, Robertson won first place in the event for gasoline stock chassis of 451 to 600 cubic inches piston displacement with a mark of 56 seconds. Kincaid bettered his former record by going the distance in 55 seconds. A Stanley steamer, driven by H. W. Bell, made the second best time for the hill, 54 1-5 seconds.

That the ascent was no child's play was again demonstrated by an accident to Ray Howard, driving a Stearns. He attempted to take the sharp final turn at too high speed, and his car crashed into the curb on the outer side of the street. The right front wheel was shattered, but the car did not overturn. Howard got a bad shaking up, but received no injury. The accident was much the same as that which sent motorcyclist Kledes head-on into the foundation wall of the house on that corner. The summary of the final events follows:

GASOLINE STOCK CARS, FOUR CYLINDERS, $4,000 OR OVER

Simplex, George Robertson	90	0:53 2-5
Stearns, E. Badenhausen	30-60	0:58 2-5
Stearns, C. H. Powers	30-60	0:59 4-5
Simplex, R. T. Heitmeyer	50	1:00 3-5
Allen-Kingston, F. R. White	48	1:02 2-5

GASOLINE STOCK CARS, SIX CYLINDERS, $3,000 OR OVER

Oldsmobile, T. Spear	60	1:14 3-5

FREE-FOR-ALL, ALL TYPES AND MOTIVE POWER

Stanley, H. W. Bell	20	0:54 1-5
Stanley, B. G. Faulhaber	20	0:58 3-5
Simplex, R. T. Heitmeyer	50	0:59 3-5
Stanley, F. W. Bellows	20	1:05

GASOLINE STOCK CHASSIS, 451 TO 600 CUBIC INCHES PISTON DISPLACEMENT

Simplex, George Robertson	50	0:56
Simplex, R. T. Heitmeyer	50	1:00
Locomobile, R. Whitcomb	40	1:04

GASOLINE STOCK CHASSIS, 301 TO 450 CUBIC INCHES PISTON DISPLACEMENT

National, T. Kincaid	40	0:55
Zust, U. P. Pisani	35	0:57 2-5
National, F. Hurmance	35	0:59 4-5

AMATEURS—CARS SELLING UP TO $2,000

Stanley, B. G. Faulhaber	20	0:57
Buick, Dr. W. H. Hafle	30	1:04

AMATEURS—CARS SELLING ABOVE $2,000

Zust, J. Derigne	35	0:56 3-5
Stearns, E. Badenhausen	30-60	1:00
Simplex, R. T. Heitmeyer	50	1:01
Allen-Kingston, F. R. White	48	1:03
Locomobile, R. Whitcomb	40	1:09 1-5

DELIVERY WAGONS UP TO ONE TON CAPACITY.

Buick, E. H. Taylor	20	2:34 48-100
Simmons, F. Reitkowski	20	2:58 1-5
Renault, J. Street	14	Not taken

NEW YEAR'S ENDURANCE BY CENTURY M. C.

PHILADELPHIA, Dec. 13—William Reuss (chairman), H. R. DeGroat, Dr. W. H. Moore, T. C. Davis, Jr., W. A. Daily, William H. Booker, H. T. Uhler, F. R. Isaac, E. V. Stratton and H. C. Evans have been named by President Hartman as the committee to manage the New Year's endurance run of the Century Motor Club. Rules and entry blanks have been distributed, and over a dozen entries have already been secured—rather quick work, when it is remembered that the run was not decided upon until the Quaker City Motor Club announced the abandonment of its annual fixture only ten days ago.

The route, as finally fixed upon after reading the report of the pathfinders who went over it last Monday, will touch Paoli, West Chester, Kennett Square, Wilmington, Chester, Media, Morton, Darby, Llanerch, Valley Forge, Phoenixville and Norristown, in the order named—about 150 miles.

OLDFIELD MAKES AN ARCTIC RECORD

DALLAS, TEX., Dec. 8—Barney Oldfield broke the 50-mile circular track record, which has stood for over five years, with a spectacular ride in the teeth of a fierce "norther." He covered the distance in 47.18, as against the old mark of 48.40 1-5, which he made at Fresno, Cal., in 1904. He got inside the old record at thirty miles and broke every mile mark to the end of the run. The car was his 120-horsepower Benz.

The track was frozen hard and Oldfield had his face wrapped in woolen bandages and wore heavy fur gloves and fur overcoat. At the finish his hands had to be pulled loose from the steering wheel by an assistant, so affected were they by the strain and the intense cold. H. A. Green, a member of the A. A. A. contest board, acted as referee, and as the meeting was sanctioned by the national association, the record will probably be accepted as official.

SOME RECENT BRITISH AUTOMOBILE DOINGS

LONDON, Nov. 27—Friday saw a memorable celebration in the shape of a banquet at the Hotel Cecil to commemorate the twenty-first anniversary of the practical discovery of the pneumatic tire. Some four hundred guests assembled, including official representatives of every society or club in any way connected with road locomotion. Prince Francis of Teck took the chair, while the guest of the evening was Harvey du Cros, M. P., to whose keenness and energy the development of the tire was due. At the conclusion of the speech-making Adolphe Clement announced that the French Government had decided to confer the Cross of the Legion d'Honneur on Mr. du Cros.

From the official statistics that are available, it is clear that the recent Olympia show surpassed in number of exhibits any previous European exhibition, while in the matter of attendance it outshone any previous British show, at least. The total number of cars and chassis on view was 597, as opposed to 575 at the 1908 Paris Salon. The British productions totalled to just over one-half. The figures were: Britain, 307; France, 178; Italy, 28; Germany, 26; Belgium, 21; United States, 16; Switzerland, 15, and Austria, 6. One other synopsis shows conclusively which form of transmission has become popular; cars with propeller shaft numbered 556 and those with chains 32. The remaining nine cars had special forms of transmission.

Regarding the attendance at the show, the total number of people passing the turnstiles was 195,000, an excess of 40,000 over the figure for last year. The best day was Thursday, November 17, when 32,567 people entered.

A company has been formed to manufacture a new composite fuel called "Rapidin." This is a German invention and consists in a method of treating the heavier petroleum oils so as to obtain light spirits suitable for automobile use. To quote from the inventor's description. "One hundred kilos of ordinary kerosene of specific gravity 0.83-0.87 are mixed with half a kilo of caustic potash and twenty kilos of benzol of specific gravity 0.9. After having been vigorously stirred, the mixture is allowed to rest for about six hours, after which it will be found to have a specific gravity below 0.8 and to contain as a sediment the matter separated from the kerosene by the caustic potash. If this mixture were distilled it would separate into its components, but if there be first added to it a material rich in carbon, such as a gum or resin, and also a nitro-compound, such as picric acid, the liquid will distill uniformly. The lighter portions of the distillate—about 40 per cent.—are suitable for use as motor spirit, while the remainder can be used as a solvent for fats and also, in part, as a substitute for turpentine.

A season without any road racing has not been altogether pleasing to all sections of the motoring community, and many people are desirous that the same policy of inaction shall not be adhered to for 1910. The first definite proposal was for another tourist trophy race in the Isle of Man, with engines limited to four cylinders of 3-inch bore. Of late, however, more daring individuals have suggested the revival of the Gordon-Bennett race in all its glory, the proposed scene of the contest being the old Irish course. The realization of this idea is not unlikely.

ROUGHING IT ACROSS THE WESTERN PLAINS

ON a pleasure jaunt, driving from Chicago to San Francisco, a party from the first mentioned city recently established a new record between the cities, traveling only by daylight, and making the distance, over 2,800 miles, in 19 days and a few hours. The trip was made in a 30-60-horsepower Stearns, driven by George C. Rew, who was accompanied by W. H. Aldrich, Jr., R. A. Luckey and H. G. Tony. They were prepared to "rough it" in good shape, and they did, for on more than one occasion they camped over night in the big Stearns, building a canvas "lean-to" against the side of the car.

Not only was there a complete absence of mechanical troubles on the trip, but there was also an absence of tire trouble, barring one puncture, and that was caused by a spike while driving on the ties of tracks of the Union Pacific Railroad. As demountable rims are standard equipment on all Stearns models, the change was made in a few moments. Mr. Rew and his party went Charles J. Glidden one better in driving on the railroad tracks, for while the premier tourist of the world used flanged wheels and glided smoothly along, the big Stearns was driven over the ties for many miles. Barring the time when the car was driven down the side of an embankment to make way for a fast mail train, the trip along the roadbed was without incident, except the one puncture noted above.

Near Battle Mount, Wyo., the car was pressed into service to carry water to a band of cowboys working on the annual fall round-up. A small barrel of the precious fluid was taken 25 miles across the plains where there was no semblance of roads. The "punchers" had noticed the water bags on the car, and a request for aid brought a quick response from the autoists.

The trip through the Western mountains was spectacular in many ways. The party chose a route away from the ordinary run of transcontinental travel, passing through many sections where no automobile had been before. When the car finally rolled into San Francisco it was found that the time for the daylight trip between Chicago and the coast had been broken, although no attempt at the record had been made.

George C. Rew's Party, in Stearns, Bringing Water to Cowboys at Battle Mount, Wyoming

WHY FRENCH MOTOR MAIL DELIVERY IS A FLAT FAILURE

PARIS, Dec. 7—Although Paris was the first city in the world to adopt automobiles entirely for the carriage of mails from suburban to central offices, and from the central to the various railroad depots, it cannot be accepted as a model to be followed, so far as details of organization are concerned. Within one year of the complete conversion from horses to automobiles the contracting company has declared itself bankrupt, has abandoned its wornout vehicles to the authorities, and the Postmaster-General after vainly endeavoring to get another company to take over the transportation of mails, has been obliged to do the work himself with the material of the bankrupt company and temporary assistance from taxicabs.

The failure is due to bad management and not to any inferiority of the mechanically driven vehicle compared with the horse species. About five years ago the postal authorities, in order to allow of later closing of the mails in the sub offices, experimented with electric wagons in place of horse vans. The electrics soon proved unsatisfactory, and gradually attempts were made with gasoline vehicles. With a view to economy some of the old horse vans were transformed into unsightly automobiles, and in still more numerous cases the bodies of the horse vans were mounted on automobile chassis.

Towards the end of 1908 a Lyons syndicate connected with the La Buire Automobile Company entered into a contract with the postal department for the entire transportation of mails in Paris by automobile. About 150 closed vans were to be put into service, 30 of this number being considered as reserve. They were of three different types, carrying loads of, respectively, 1800, 2600, and 4000 pounds. The mileage was fixed at an average of 50 per day for each vehicle, and the average speed for the journeys had to be not less than 13 miles an hour.

A bad start was made with only half the necessary number of automobiles, the result being that in order to carry all the mails these had to be kept running for twenty-two hours a day, making proper verification difficult and repairs almost impossible until the vehicle had been completely put out of business.

It was not long, too, before the contracting company found it had made a serious mistake in guaranteeing an average speed of 13 miles an hour in Paris. The central post office is in the most crowded portion of the city; the railroad depots are also situated in districts where street traffic is most intense. The individual journeys were never more than two or three miles in length, with the result that if two or three minutes were lost at the commencement through a block in the traffic, an excessively high speed had to be maintained to gain the time lost. An average of 13 miles an hour in Paris meant speeds at certain moments of 25 to 30 miles an hour.

Such a rate of travel was disastrous to the vehicles, obliged to advance by leaps and bounds, throttle wide open as long as possible, with harsh usage of the brakes when collisions were inevitable. It was equally disastrous to the public, accidents taking place every day, some of them, unfortunately proving fatal. With its 150 automobiles in a wornout condition and ruin staring it in the face, the company a few days ago refused to continue with its contract, although this refusal meant the abandonment of all its vehicles to the postal authorities. Under the contract the company had undertaken to carry the mails at a rate which practically worked out at 17 cents a mile. In view of the high speed and exactitude required this sum was found to be far too low. For an ordinary delivery service, where speed was not absolutely necessary, and in districts outside of Paris, where gasoline is cheaper, it might have been possible to make a profit. It proved impossible to do so in the case under consideration.

At present the postal authorities are running the automobiles themselves, but being without expert management, and having to deal with a fleet of vans almost worn out from neglect and overwork, have to rely considerably on outside aid from the taxicab companies. An endeavor has been made to find a company willing to run the abandoned automobiles, but without success. It will doubtless be necessary for the postal authorities to undertake the service itself to the best of its ability until a fresh company has had time to get together a fleet of automobiles. It is certain that in order to obtain a satisfactory service the postal authorities will have to be prepared to pay a higher price and be content with a lower average speed, unless some badly needed improvements can be made in Paris traffic conditions.

Despite the unsatisfactory nature of this first attempt to abolish the horse in the mail service, the authorities have no intention of abandoning mechanical traction. The time saved and the greater reliability are too considerable to allow of the horse being introduced again. Even when the present badly organized scheme was at its worst relief was obtained not from the horse owners but from the automobile taxicab companies. The only work that is left to the horse in the Paris postal service is in drawing the buses which carry the letter distributors to their rounds. As the distance is not great and the men drop off the vehicle every few hundred yards on reaching the commencement of their rounds, the slow speed of the horse bus is to be preferred to the more rapid automobile.

PARIS TAKING LESSONS FROM NEW YORK

PARIS, Dec. 8—Paris is now taking lessons in traffic regulation from New York. Colonel Eno, who claims to have done much to put traffic straight in New York City, undertook to train the lawless Parisian driver to a true respect for the rules of the road. The first experiment has been made in the Rue de la Paix, at this time of the year one of the most crowded streets of the city between 2 and 5 p. m. Mounted municipal guards were instructed under the direction of the American colonel to perform the same service as the mounted police in New York City. The guards occupied positions at intervals down the center of the street, and made the traffic keep in well-defined lines, not more than three abreast in each direction. It was forbidden to cut across the street in the free and easy manner of the Parisian cab driver, crossings being made on the American system at the intersection of streets only. The experiment having proved such a success, it is intended to extend the system to other portions of the city and continue it until the drivers are thoroughly trained.

PEERLESS OPENS NEW YORK SALESROOMS

NEW YORK, Dec. 13—This city has many magnificent and elaborate automobile salesrooms, but the one just opened to-day by the Peerless Motor Car Company, on Broadway, corner of Fifty-seventh street, will rank with the finest of them. The opening, too, ranks with anything in this line ever attempted. Hundreds of guests dropped in during the day to inspect the decorations. Among others who participated in the housewarming were Vice-President E. H. Parkhurst and Treasurer F. I. Harding, of the Peerless Company of Cleveland; W. H. Johns, E. H. Broadwell, Archie Hughes and Percy Neil, of Philadelphia; G. H. Smith, of Newark; Joe Ball and Harry Pike, of Detroit; E. N. Carples and Frank Bowen.

ACETYLENE BURNER PATENT INVALID

WASHINGTON, D. C., Dec. 11—The Supreme Court of the United States has declared invalid the Dolan patent, number 589,342, which was claimed to cover all commercial forms of acetylene burners. The cases were styled those of D. M. Steward, M. Kirchberger, *et al.*, vs. the American Lava Company and Paul J. Kruesi, and M. Kirchberger *et al.* vs. the American Lava Company and Paul J. Kruesi. The decision supported that of the U. S. Court of Appeals and ends seven years of litigation.

MASSACHUSETTS WARNS CARELESS NIGHT DRIVERS

BOSTON, Dec. 11—Because of the many accidents that have resulted from improper operation of automobiles at night the Massachusetts Highway Commission has issued a warning in which it says that it will take summary action in all cases in which the requirements of safe and proper operation are not complied with. The text of the warning follows:

A number of accident cases have been heard by the Massachusetts Highway Commission within the last few months which have made plain one frequent cause of great danger to both the automobilists and the public in general. That is the operation of automobiles when there is not light enough to enable the road and the persons using it to be seen clearly, at such a rate of speed that the operator is not able to stop his car in time to avoid a collision. These accidents, and there have been many of them and several resulting in death, have invariably happened when the automobile had no cetylene gas lamps lighted. The operator, without them, could not see far enough ahead at the speed at which he was moving to stop in time.

Automobiles have collided from this cause with derricks, platforms, teams going in the same and in opposite directions; have run over foot passengers and have even run through a board fence and dropped onto a railroad track. While there is no provision of law requiring the use of searchlights and possibly they are not needed in well-lighted city streets, the commission feels that it should call the attention of all automobilists to the matter, since operators who have come before the board have seemed to think that if they were upon the right-hand side of the road, and if they had the lighted lamps which the law does require, and if they were not operating at a greater speed than the law permits at that point on he road, no fault could be found with them if they sruck, for example, a foot passenger who was in the road, and who, they claimed, should have been on the sidewalk.

In one case a foot passenger was not seen because of an electric light which may have dazzled the operator somewhat. Every operator must realize that when he has no searchlights he cannot see far beyond a bright electric light and that he runs quickly into a dark zone. Such conditions have caused two deaths, at least. The board feels that operators cannot be exonerated from blame under such circumstances, and that, whether they have searchlights or not, all persons are bound to operate at a speed which is reasonable and proper under the conditions which exist. And a speed is never reasonable and proper if, under any conditions, the operator cannot stop his car when he sees an object on the road, before he strikes it. If necessary, he must stop his car and cease to operate when he cannot run it so as not to endanger other users of the highway who are exercising reasonable and due care.

This rule should be applied not only where the streets are imperfectly lighted, or where one is dazzled by an electric light, whether a street light or that of a street car, but around corners and curves, or where one's view is obstructed by other vehicles in passing, or when one cannot see clearly because of a fog or mist. The board feels compelled to make this announcement at this time because of the many recent accidents and fatalities in which both pedestrians and occupants of automobiles have been involved. It desires, therefore, to give notice to all automobilists that it will take summary action in all cases coming before the commission when it develops that the foregoing requirements for safe and proper operating have not been complied with.

WISCONSIN OIL INSPECTION LAW IS CONSTITUTIONAL

MILWAUKEE, Wis., Dec. 13—The Wisconsin oil inspection law of 1909, which requires the official inspection and branding of every gallon of gasoline and kerosene used in Wisconsin, has been declared constitutional by the Wisconsin Supreme Court in the suit of the Wadhams Oil Company, of Milwaukee, a big independent concern, for an injunction to restrain Chief Inspector Edward L. Tracy from enforcing the law. The State charges a fee of 10 cents for every barrel inspected. About 750,000 barrels of gasoline and kerosene are used every year.

TO MAKE ROAD SIGNS COMPULSORY IN MARYLAND

BALTIMORE, Dec. 10—A bill making it compulsory for the city, county, town and village authorities in every section of Maryland to erect suitable signs and signposts for the guidance of motorists has been drawn up by Col. Sherlock Swann, a member of the Maryland Automobile Commission, and will be passed at the coming session of the State legislature, which convenes in January. The bill says that the officials referred to shall erect and maintain at or near the boundary lines of all important thoroughfares leading out of the various cities, towns and villages, and at every place of intersection of important highways in the counties guide posts for the direction of motorists. These posts shall be not less than eight feet high, and near the upper end of them shall be placed signs of metal or wood which shall contain in plain letters and figures the names of the next towns or places to which each road leads, the number of miles to the same and the figure of an arrow pointing towards such towns or places. The bill further prescribes that it shall be the duty of the State Roads Commission to see that the law is enforced. Persons destroying such signs are liable to a fine not exceeding $25.

DON'T FORGET YOUR LICENSE IN THE NUTMEG STATE

HARTFORD, CONN., Dec. 13—Police are rigidly enforcing every provision of the new State automobile law and the autoist who forgets to have his license card with him will be liable to land in a police court. Early in the week a repairman at a local garage took down a rear axle to repair it and in doing so removed the rear number. When the member was again in place he thought he would try out the car around the block. He left off the rear marker. A member of the police traffic squad saw that he did not have the rear marker and he was ordered to appear in court the next morning. He pleaded guilty to not having the rear marker in place and although he explained the situation to Judge Clark he was fined $5, and in addition to the five he had to pay $2 more, as a record of the trial has to go to the Secretary of State. For this bit of work the clerk of the police court is reimbursed to the extent of $2.

There are now pending before the Secretary of State three cases where motor-car drivers are liable to lose their licenses. The testimony is all in and the matter now hangs fire.

BILL TO STOP JOY RIDING IN KENTUCKY

LOUISVILLE, KY., Dec. 13—At a meeting of the Louisville Automobile Club, held Tuesday, the secretary was instructed to request every autoist in the State to aid in the passage of the bill to be introduced at the next session of the legislature by Senator Herman D. Newcomb, making it a felony for anyone to use an automobile for any purpose without the consent of the owner and, upon conviction, the offender shall be punished by a term in the penitentiary of not less than one year. This is aimed at joy riding. The bill to be introduced follows:

Be it enacted by the General Assembly of the Commonwealth of Kentucky:—That any chauffeur or other person, who, without the knowledge and consent of the owner shall take or cause to be taken from a garage, stable or from any other building or place, an automobile or motor vehicle and operate or drive, or cause the same to be operated or driven for his own profit, pleasure, use or purpose, shall be deemed guilty of a felony, and upon the conviction thereof shall be punished by a term in the penitentiary of not less than one nor more than three years.

What the Clubs Are Doing These Days

DENVER MOTOR CLUB'S COMPREHENSIVE PLANS

DENVER, Dec. 4—The Denver Motor Club, which is now nearing the end of its second year of existence, is already making plans for the coming season. The officers of the club have decided to call a good roads meeting in the near future to which the county commissioners, the board of public works, the Denver Real Estate Exchange, the Chamber of Commerce, and similar bodies will be invited. This meeting should be the biggest one ever held in Colorado.

The excellent work carried on by the penitentiary commissioners with convict labor has shown wonderful results, especially in the southern part of the State. During the past season 300 convicts were employed in this manner.

Several ordinances have been passed by the Denver council which have greatly pleased automobilists in the city. One of these requires slow-moving vehicles to keep near the right-hand curb, an idea already adopted by other large cities. Much good work has also been done in breaking up joy-riding.

For the coming season the club plans a number of events, which are announced as follows: Two road races, one on Decoration Day and one on Labor Day; a reliability contest in June; a gasoline economy contest in October, and a hill-climbing contest in November.

NEW ROAD BETWEEN PHILADELPHIA AND BETHLEHEM

PHILADELPHIA, PA., Dec. 13—Through the efforts of the Automobile Club of Philadelphia, the stretch of bad going on the Sellersville road, between this city and Bethlehem, is being macadamized, the work being nearly completed. The members of the good roads committee passed round the hat, and, after securing sufficient to start the work, went ahead, relying upon the generosity of automobilists to complete the fund. There expectations seem in a fair way of being realized, as small contributions began pouring in from all directions when the papers began to exploit their enterprise. While the new route is a third of a mile longer, it will furnish tourists with a perfect bit of road and save each car thirty cents in toll charges.

BIG CROWD EXPECTED AT NEWARK, N. J., BANQUET

NEWARK, N. J., Dec. 11—H. D. Bowman, A. B. Le Massena and Joseph H. Wood, the members of the committee in charge of the annual banquet of the New Jersey Automobile and Motor Club January 24, expect a greater number of applications for seats than at any of the previous annual dinners of the organization. The banquet is to be held at the New Auditorium in Orange street, Newark. The membership of the club is now close to 1,900, and additional members are being elected at every meeting of the club's board of trustees. The banquet committee is now arranging for the presence of several well-known men to speak.

DENVER MOTOR CLUB AFTER AUTOMOBILE THIEVES

DENVER. Nov. 27—As automobile thieves are again becoming active in this city, the Denver Motor Club has begun a vigorous campaign. An advertisement has been inserted in the daily papers offering a reward of $100 for the arrest and conviction of anyone stealing an automobile belonging to a club member. The club has had one of its officials sworn in as a special police officer, and in addition has secured the co-operation of the regular police force. Any person caught will be prosecuted to the full extent of the law, as the situation demands most drastic measures. Trouble is also in store for anyone who abstracts tires, lamps, robes, tools or other accessories.

QUAKER CITY MOTOR CLUB'S ANNUAL BANQUET, JAN. 6

PHILADELPHIA, Dec. 13—The decision to drop the punishing New Year's run from its fixture list has given the Quaker City Motor Club's workers an opportunity of concentrating all their efforts on the club's annual banquet, on Thursday, January 6, at the Hotel Walton, and from present indications that affair will be the banner event of the Quaker's social season. Among the notables who have accepted invitations are: Governor Stuart, Mayor Reyburn, Congressman "Hamp" Moore, Director of Public Safety Henry Clay, Mayor Stoy, of Atlantic City; State Senator Webster Grim, Director Neff, of the Department of Public Health and Charities; President Hazlett, of Select Council; President McCurdy, of Common Council; United States Senator Penrose, Director Hasskarl, of the Department of Wharves, Docks and Ferries; numerous prominent lights of the American automobile and newspaper worlds, and others.

The success which attended the recent Fairmount Park race has given the club such prestige that the guest list will be something out of the ordinary, and what would under ordinary conditions have been a strictly local function now promises to attain the dimensions of a national symposium.

NEW YORK COMMUTERS ATFER COWBOY POLICEMAN

NEW ROCHELLE, N. Y., Dec. 11—The board of governors of the Automobile Club of New Rochelle held a special meeting to act on the case of a New Rochelle policeman who shot at Harvey Husted's car on November 15, and called the attention of the police commissioners to the fact that the officer in question was not in uniform and did not display his badge. The governors have given out a statement in which they say that the manner of arrest and the malicious and unwarranted use of firearms were illegal and dangerous to public safety, and that the city of New Rochelle is liable for damages.

LOUISVILLE, KY., LOOKS FORWARD TO NEXT RUN

LOUISVILLE, KY., Dec. 6—Tentative plans were discussed at a meeting of the Louisville Automobile Club for the second annual reliability and economy contest, to be held next year. The second run will probably be through the western part of the State and may extend south as far as Nashville, Tenn.

When Eugene Straus, president of the club, finishes his work on the touring book, it will contain the most complete and correct maps ever made of this section of the country.

ERROR IN ANNOUNCEMENT OF CHICAGO DIRECTORS

CHICAGO, Dec. 11—Officials of the Chicago Motor Club have announced a change in the board of directors of that organization elected at the annual meeting last week. The first announcement of the results of the election included Joseph B. Deibler as a member of the board, but when the votes were recounted it was found that Charles E. Gregory had received more votes than Mr. Deibler. The officials thereupon announced the corrected list of directors, with Mr. Gregory's name in place of Mr. Deibler's.

DELAWARE PLANS NEW YEAR'S ENDURANCE RUN

WILMINGTON, DEL., Dec. 4—George Proud, of Philadelphia, representing the Century Motor Club of that ciy, was here today in the interest of a roadability run to be given on New Year's Day to Wilmington and return, by way of Chester and West Chester, Pa. The club desires to interest the Board of Trade in each town and to get them to co-operate to the extent of having machines in the run representing their cities.

CHICAGO CLUB'S GIGANTIC SIGN-POSTING CAMPAIGN

CHICAGO, Dec. 13—The Chicago Motor Club is bringing to a successful completion a campaign for signboarding the country hereabouts which has been spread over 2 years and which has engaged the services of an energetic committee. The latter has gone about the matter in such a scientific manner that it is thought the groundwork has been laid for a system that eventually will mark the country roads in as effective a manner as are city streets, so that your motorist can travel from town to town in Illinois, Indiana and Wisconsin without having to stop at every cross-roads to inquire the way. If the calculations of this committee prove correct all the motorists of the future will have to do when he comes to strange cross-roads is to consult the cast-iron signboard of the Chicago Motor Club and be "put wise."

In laying this foundation the Chicago Motor Club has been wise enough to peer into the future and realize that eventually this signboarding must be attended to by the various counties because of the fact that when the posts are put up through private enterprise like this there is nothing to protect the post and its sign from the depredations of those miscreants who find their enjoyment in destroying something that has been put up by other than official authority.

Then, too, the cost of such signboarding is so great that it is folly to expect motoring interests to stand all the expense. Therefore, the Chicago Motor Club has figured that by taking four of the big trunk lines running out of Chicago and properly marking them that this will be an object lesson with which it and the allied interests may go before the county supervisors and ask that all roads be treated in a similar manner. Also, after this education has been completed, it will be possible to invoke the aid of the legislature either to compel the enforcement of the old law or enact a new one that will make it compulsory on the part of the road supervisors to see that all the roads in their respective territories are properly marked.

Farmers' Antipathy Gradually Lessening—Much of the antipathy toward motoring enterprises may be done away with by this educational step taken by the Chicago Motor Club. If the farmers see that the motorists are willing to bear their share of the expense and that the object of the motorists is the common good then they will be more amenable to reason. In another five years it will come easy for the road supervisors to attend to this part of the work.

With the ground work well laid through the enterprise and hustle of the signboard committee, at the head of which Joseph V. Lawrence has served for the past two years, the Chicago Motor Club proposes to have for two cardinal points, good roads and signboards, believing that they are the cornerstones to motoring successes in this vicinity. But the club believes there should be a community of interests and that success in both these departments only can be achieved by the banding together of the leading clubs and organizations; that success only can be achieved in this manner.

The signboard campaign really started some three years back when the Illinois signboard commission was formed and nearly $100 raised by popular subscription to push the work along. Some signboards were purchased and a few put up, then interest in the commission slacked and eventually the Chicago Motor Club fell heir to the entire proposition. Then it was realized that an organization scheme would have to be mapped out and the scheme followed through to the end.

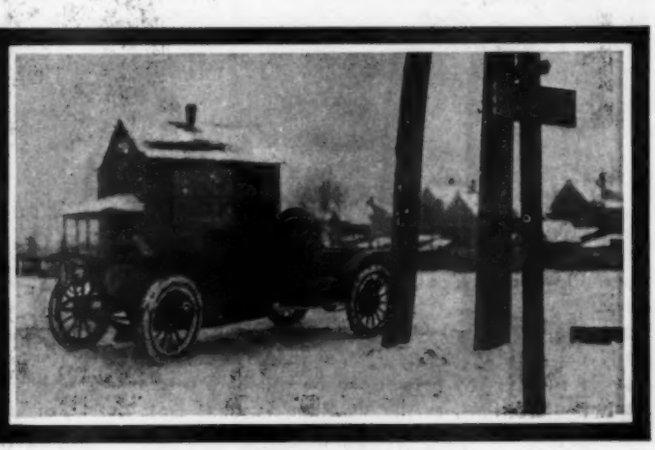
It was like a huge business enterprise and had to be carried through slowly. First of all financial support had to be sought, then the organization completed, the routes pegged out, the signs ordered, and finally put up. All this has required time and for the last two years, Chairman Lawrence and his commission has been at work on it. It was not until the last month, though, that the motor club was able to point with pride to the success that has attended its efforts.

Announcement of Completion, a Big Surprise—When Chairman Lawrence arose at the annual meeting of the Chicago Motor Club a week ago and announced that he had practically finished three of the four routes selected and that the last one would be completed inside a couple of weeks, weather favoring him, he surprised the lay members of the club who had not known much of the progress of the compaign, so quietly had Chairman Lawrence worked. Without any blare on the publicity trumpet, Lawrence had quietly sent out his forces and when he finishes this month, he will have expended $2,000 in signs and will have put up 290 posts on which will have been placed 787 signs.

Furthermore, as a monument to the enterprise of the Chicago Motor Club, there will be located at the corner of Jackson boulevard and Michigan avenue in Chicago—the north pole of this motoring expedition—a huge tablet on which will be the direction and mileage of nearly every town of importance within a radius of 100 miles of this city.

Ready for touring next summer will be four routes. The first one completed is to Beloit, the signs blazing the trail by way of Elgin, Algonquin and Lake Delevan. Another route will be to Lake Geneva by way of Rogers Park, Niles Center, Wheeling, Wauconda and Genoa Junction, which route was made possible by E. E. Ayer, who contributed the $500 for marking this course. Both these are done at the present time. The route to Milwaukee has been completed to within 15 miles of the Cream City, work being stopped there because of the condition of the roads which, being muddy, would not permit of the

Old Wooden Sign Alongside New Iron Sign at Road Crossing



One of the Scouts Doing Some Preliminary Work

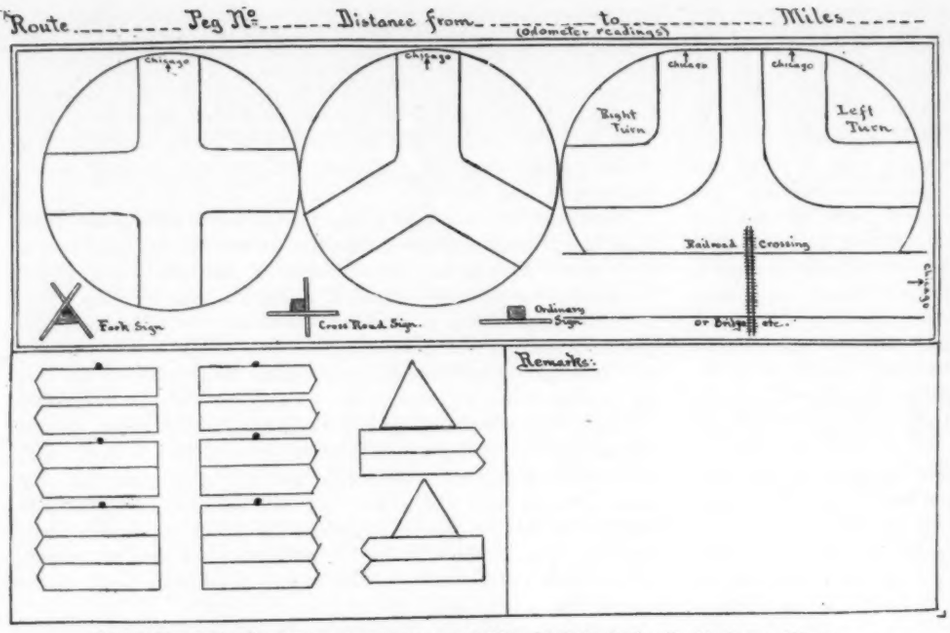


Chart Used by Chairman Lawrence and His Assistants in Preliminary Work

expedition making much progress of a permanent nature.

As soon as the ground is frozen, this work will be completed, the Chicago Motor Car Company, Packard agent, having agreed to finance the proposition. This leaves only the Chicago-South Bend route to be marked and it is proposed to go at this at once so that by New Year's, the four great trunk lines running out of Chicago will have been completed.

Chairman Lawrence then will have completed his task. It being done, he is ready to step down and let others carry on the work. This the motor club proposes to do in an energetic manner, the idea being to interest other clubs and organizations with the intention of appealing to the Legislature for help in this direction.

Very Businesslike Plan Adopted—The plan of campaign followed by Lawrence and his colleagues was most businesslike. He realized that it would be impossible to start at it hit and miss, so the first thing he did was to send out expeditions to mark the various courses, picking out the locations for the signs. To do this he devised a most comprehensive chart, there being a card for each post on which was marked the route, the peg number, the distance from one point to another by odometer.

Then came three cross-road maps in outline. One showed the conventional four corners and on it could be marked just where the post should go. Another showed two roads converging into one that could be marked in the same manner. A third showed a right turn, a left turn, and a railroad crossing. In another part of the chart were the various signboards that were to be put up and the pegger could designate just which one could be used. In this manner, Lawrence and his forces went over the four routes and had all the data required before the signs were ordered. Then the chairman sought bids for the work. It was not his intention to actually put up the signs himself, believing that the work could be done better by paying for it than it could by relying on volunteers. And so it has proved.

From the Featherstone Foundry & Machine Company, the signboard committee secured a bid for the signs. The price agreed on was 65 cents for a cast-iron sign 20 inches long and 4 inches wide; for a double sign the price was $1.15 and for a triple sign $1.75. Where more signs were required on one post it was possible to use several of these styles in combination, as, for instance, the Latrobe steel mills sign at Melrose Park on the way to Elgin there is a sign with seven tags.

In all 787 signs were ordered, the aggregate cost of which was in the neighborhood of $600. Then it came to the selection of posts on which these signs could be placed. The contract for these was placed with the Hines Lumber Company, which furnished 290 tamarack posts 12 feet long and 4 inches square, at a cost of $22 a thousand feet, the total cost being approximately $100.

Equipped with supplies, Chairman Lawrence then sought someone to put up the posts and signs, finally entering into a contract with Joseph T. Elmore and Herbert J. Ross, of the Chicago Ad-Sign Company, to paint, deliver and erect these signs on the different routes at $3.55 a post, the contract netting approximately $1,000. The contract called for painting the

Some of New Signs—At Railroad Crossing, Elaborately Marked Intersection, Dangerous Turn

posts with creosote paint, painting the signs themselves with non-rusting paint, painting the letters in white enamel, boring holes in the signs by which they could be fastened to the posts, attaching the signs, and then putting up the posts in holes 4 feet deep. It was necessary to anchor and tamp each post.

How the Signs Were Put Up—Under the contract Elmore and Rose were to provide their own means of transportation. They had intended using a horse and wagon, but Chairman Lawrence was in a hurry to complete the work so he secured from the Randolph Motor Car Company, of Chicago, the use of one of the company's light trucks, the Randolph Company cheerfully donating the use of the machine, but Elmore and Ross paying the expenses of the expedition and the salary of the driver. The Randolph truck proved of greatest benefit to the Commission. Much ground could be covered in a day despite the adverse weather conditions. The truck has been on the job at all times, never giving the expedition the slightest trouble and covering many miles in the course of the day.

The way Elmore and Ross work is to ship a supply of posts and signs along each route, dropping a bunch every thirty miles. Then they come along in the truck, pick up the supplies and place them in the next thirty miles of territory. It requires two men to place the signs. As one man is digging the 4-foot hole in the ground, the other is attaching the sign to the post. It takes about three hours to place a post and sometimes more, according to the conditions. At the Latrobe steel mills it took a day because the ground there is made up of steel filings which made the work specially laborious. In favorable weather the expedition can label a 100-mile course in one week.

Chairman Lawrence reports that his chief difficulty in laying out his routes was to get the necessary permits from the various townships, it being necessary to make several trips to each before these permits would be issued. He found in many places that there was opposition to the idea, the villagers declaring they did not want the signs up because that would bring motorists through their towns, which they apparently did not want. However, after the expenditure of considerable time, all these permits were secured.

In some places, though, Lawrence was greeted with open arms by the villagers, who were sufficiently broad minded to welcome the innovation. At Bloomingdale, on the Elgin route, Lawrence found unexpected co-operation. He had secured the permit and a sign had been erected in that village. It was no sooner up, though, than the report came that some farmers had taken it down and moved it to a point two miles distant for the purpose of misleading the motorists. Just as Lawrence was prepared to investigate, the selectmen of the town acted. They held a meeting and ordered the farmers to put the sign back where it belonged under penalty of prosecution, inside of a week. The sign was moved at once.

In summing up the situation and the expense, Chairman Lawrence finds that in addition to the cost of $3.55 a post, there must be added the sum of 15 cents a mile for pegging out the routes preliminary to putting up the signs.

REDUCED RATES TO NEW YORK DURING SHOW WEEKS

ARRANGEMENTS have been made by the American Automobile Association to secure reduced railroad rates for members of the association who intend to visit New York during the weeks of the two great automobile shows. Open meetings will also be held during these weeks at the National headquarters, 437 Fifth avenue.

The reduced rates apply to points in the following territory: New York, New Jersey, Pennsylvania, Delaware, Maryland, the District of Columbia, Virginia (points of the Chesapeake & Ohio and the Baltimore & Ohio), West Virginia, Ohio, southern Michigan, Indiana, eastern Illinois (points on or east of the C., R. I. & P. from Chicago to Peoria, the T., P. & W. from Peoria to Burlington, and the Mississippi River from Burlington to Cairo), and the cities of Louisville, Ky., and St. Louis. Members outside this territory will find it advantageous to buy tickets to the nearest point at which the reduced rate can be secured, and there buy tickets under the reduced rates.

In amount the reduction will be equal, on the round trip, to two-fifths of the one-way fare. It should be noted that this is not equal to one-fifth of the round-trip fare. Reductions will be made on the certificate plan, the purchaser of the ticket paying the full price at the ticket office, but asking for a certificate. These certificates may be presented for validation to Secretary F. H. Elliott of the A. A. A. The Trunk Line Association will also keep an agent at the Forty-third street entrance of the Grand Central Palace to validate the certificates, for which a fee of 25 cents will be charged. The amount of the rebate will be credited on the return ticket.

Those intending to visit the Grand Central Palace Show may purchase tickets not earlier than December 28 nor later than January 2, and the certificates when duly validated will be good up to and including January 11 on a continuous return trip over the same route. Certificates will be validated on and between the dates of January 4 to 7. No certificates will be validated after this date for any reason, and no refund will be made unless the certificates are properly validated. The reduction is not guaranteed, but is contingent upon at least a hundred certificates being presented by tradesmen desiring to attend the show.

For the Madison Square Garden show the same plan will apply. Tickets may be purchased on and between January 5 and 10, and the certificates will be good on a continuous return as late as January 19. Only members of the automobile clubs associated with the American Automobile Association and individual members will be entitled to these reduced rates. Further information may be obtained from Secretary Elliott, at 437 Fifth avenue, New York.

Alfred Reeves, of the show committee of the A. M. C. M. A., has issued a warning that the weeks of the automobile shows are the biggest in the year for the New York hotels, not even excepting Horse Show time, and that prospective visitors should therefore reserve their hotel accommodations well in advance. The Hotel Manhattan will, as usual, be the headquarters of the show committee.

APPLICATIONS OUT FOR NEWARK SHOW

NEWARK, N. J., Dec. 11—H. A. Bonnell, manager of the annual show of the New Jersey Automobile Trade Association, has mailed application blanks to about three hundred dealers in automobiles and accessories. The show is to be held in the Essex Troop Armory, February 19 to 26, and as most of the dealers in Newark have declared their intention of displaying their cars, it is expected that the available space will be contracted for some time ahead. Space on the main floor is to be sold for 70 cents a square foot, and space on the balcony for 40 cents. The applicants or their representatives are to draw lots for the allotment of spaces at noon, January 28. Manager Bonnell is now considering plans for decorations.

OHIO ASKS FOR GOOD ROADS MONEY

COLUMBUS, O., Dec. 13—State Highway Commissioner J. C. Wonders has filed with the State auditor estimates for the needs of the department for road improvement for 1910. He asks for $880,000, or $10,000 for each of the 88 counties of the State. He also asks for additional money for the employment of engineers. Last year the appropriation for road improvement was $5,000 per county.

The Private Garage Problem

By Morris A. Hall

Part 9

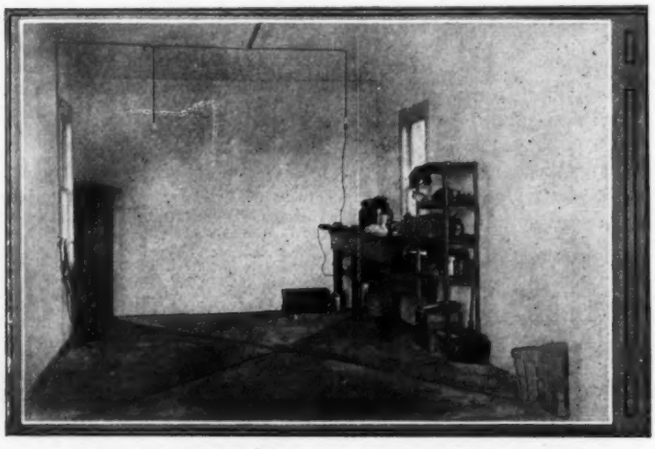
Iowa Garage Built as Part of Side of the House to Save View of Mississippi River at the Rear

INTERIORS present a fertile source of discussion, principally for the reason that the ordinary person does not understand or else cannot read a drawing. So to these people the showing of a plan drawing means little. A photograph of an interior, on the other hand, may be read and understood by any one, to say nothing of criticising the arrangement of the interior there shown, which is an impossibility with the architect's floor plans.

For this reason the present instalment of the garage story will be devoted to interiors. These present the opportunity to bring out another feature of the garage, which in weather like the present—that is, in the winter time—is of unusually pertinent value. By this reference is had to the question of heating of garage interiors, whatever be the system.

Heating presents a number of problems, some of them dating as far back as the planning of the building in the first instance. By this is meant such a selection of size of building as to allow of the later installation of a heating system without reducing the available floor space to a too small amount, such a selection of materials and form of construction as will reduce the heating problem to its lowest terms, and such a selection of heating means as will call for the least amount of work attending to it, in company with a moderate installation cost, simple form of apparatus to reduce repairs, etc., to a minimum, and high efficiency.

Prevention of Freezing the Real Reason for Heat—Contrary to the common notion, the idea of heating a garage is not to keep it warm in the ordinary sense of the word, but to prevent the water in the jackets from freezing and the oil in the gearcase and crankcase from congealing. To this must be added the proviso that the chauffeurs' quarters be not an integral part of the garage. In that case the two parts must be differentiated between, for the driver and his quarters must be kept warm, while the car and its compartment need not be actually warm.



Typical Small Car Garage Interior, Showing Workbench

The various heating arrangements are as different as the many systems of heating of which the owner and builder has a choice. Speaking generally, it may be said, as of house heating, that there are four systems, with many, many variations and additions to them which constitute the make-up of perhaps a hundred different ones. The four principal ones are, however, unit or localized heating, in which a series of units such as stoves, fireplaces, etc., are used to heat certain units of localities; hot air, in which all rooms are heated from one unit, preferably a furnace; steam, in which system again a single unit of heat conveys warmth to all rooms, and lastly, hot water, which is like both steam and hot air in that a single source of heat is used.

Of course, some of the combination systems are of more than passing worth, and should not be dismissed with a word.. Thus the method of utilizing steam or hot water in radiators to heat pure cold air, which is then circulated as a source of heat, is much used. Then the positive differential system, in which the steam supply to each and every radiator may be controlled accurately (this being a modification of the steam system), is very good.

Low First Cost Accounts for Many Peculiar Heaters—For the garage, on the other hand, most of these methods have the initial and apparently insurmountable fault of being altogether too elaborate, and consequently altogether too expensive. So the consideration of garage heating must start with something very simple and of low first cost. This accounts for the use of some peculiar heating methods as previously described.

Thus, in one of the previous issues a large garage was shown and described in which the only source of heat was a large open fireplace. This was, however, very large, provided with a capacious chimney to afford plenty of draft, and after several years' use has been found satisfactory for the heating of this particular garage, or at least sufficient to prevent the two Haynes cars owned from freezing up.

Another three-car garage, shown last week, has no other source of heat than a very big stove placed in the middle of the side of the garage floor. In addition to the car floor, this heats the chauffeur's floor above. The fire may be driven rather hard for the purpose of sending plenty of heat upstairs without actually heating the ground floor very much. But at that the heat should be sufficient to save the plumbing of the building and the water jackets of the three Thomas cars. No one stove, no matter how large,

could actually make this room hot, since it is 25 feet wide by 60 feet long, and liberally provided with windows to carry off the heat as rapidly as the stove can furnish it.

After a close investigation of the subject the writer is forced to the conclusion that the majority of garages are heated by means of stoves in some one form or another.

Use of Stoves Well Nigh Universal—These vary in size with the area of the garage and the attitude of the owner toward the matter of heat. Some owners—and it is a pleasure to state that their number is growing less each year—put the car up for the winter, thus losing the use of it for about four months. These owners, of course, know little and care less about the matter of heating, their interest being confined to drawing off the water when the car is put away and refilling it when the car is brought out in the spring.

On the previous page is shown the interior of a small one-car garage, which has been described and the exterior illustrated in one of the earlier numbers. This interior shows no heating arrangement, but some of the other features are worth calling attention to. The work bench, tool box, cabinet for clothes or spare material, and shelves for the same, may all be seen. It will be noticed that the place is lighted by electricity, one of the sockets serving as a place of attachment for the electric vulcanizer. This can be seen on the far end of the work bench. The bare spot between the work bench and the cabinet with doors at the left was left purposely, the idea being to place a small lathe there later on. It was the intention to drive this by means of electricity, the lathe being direct-driven from a small motor mounted upon an integral part of it and wound to use lighting voltage.

The lamp connection seen at the window would be used for this, so as to leave the present overhead light. At present the connection at the window is used for a portable lamp, allowing the use of the light wherever needed. Similarly, with the vulcanizer, the extension on that permits of using it on the tires, which need not be taken off the machine, but are vulcanized in place.

In the center of the floor the drain, and the slope of the floor sides toward it, give a hint of the washing methods, although the position of the camera was such as to fail in showing the source of water supply at the front entrance, or the entrance either.

Heat Supplied for House in Many Cases—As has been chronicled several times before, the heat may be supplied from the house heating system when the two buildings are sufficiently close together to make this a practical thing to do. When the garage and house are separated by a space of more than 25 feet this method becomes of doubtful utility, particularly in the case where the chauffeur's living quarters are included in the garage building.

In the issue of Dec. 9 the garage of squared field stone shown at the head of the article there was heated in this way, as was also the one shown at the bottom of the same page. Both of these were very close to the house and the source of heat, the former being within 15 feet at the point where the pipes were carried across. In the latter instance the distance was not as small as this, but was about 20 feet.

Cases like the one shown at the head of this article are few and far between, but at that the heating problem was an easy one to solve. In this case the garage was built as an integral part of the house, being the small square extension at the left, in front of which the car is standing. Aside from ease and certainty of heating and the apparent convenience of this location, the owner had another idea in locating the garage as the picture shows it.

This was the view from the rear. The Mississippi River flows past the rear of the house, the bluff upon which the house is situated being one of the banks of the river. With this idea in view the owner built a fine porch or veranda clear across the rear of the house, on which he could sit and view the river, with boats passing up and down. This fine view he did not want obstructed. So the garage had to be built at the side.

As built it has two doors, one at each end, closed by means of sectional steel blinds, which roll up out of the way like a window shade. By opening both the owner may drive through, turn around on the drive back of the house and come back through

Radiator in Plainfield Garage Is Large and Prominent

towards the street. At the left side, there are two narrow but very high windows, which have prism glass to increase the amount of light furnished to the interior.

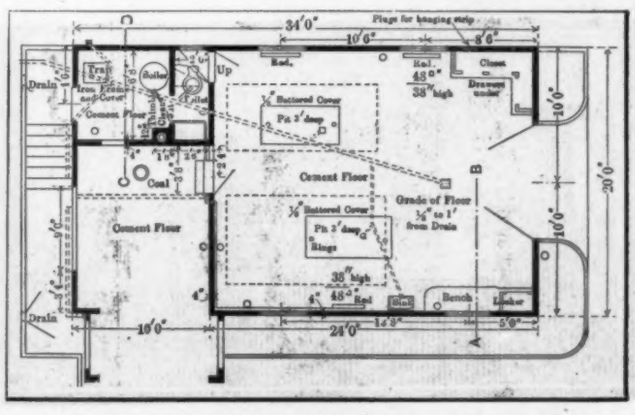
Heat is furnished to the garage interior from the steam plant located in the basement. Steam coils are placed along the side nearest the house. Since the garage is practically a part of the house, the heating offers no difficulties other than the ordinary plumber's pipe-fitting.

Interior of Garage with Superior Equipment—At the head of this page is shown a garage interior in which are to be seen a number of things in the way of equipment which have not been seen in any other garage pictured thus far. This building not only has a large pit, as the picture shows, but means for heating the whole interior adequately, a large-sized lathe, forge and anvil, drill press, electric vulcanizer, and many other little conveniences of value to the owner who has learned to do his own repairing.

Electric drive is utilized for the lathe, as well as all other tools, this being provided through the medium of the small motor shown in place on the bench in front of the lathe at the right. This lathe is also arranged to be run by foot-power should the owner so desire. The stoutly constructed bench carries the usual vise, and adjacent to it, in the corner, is the group of shelves, which are arranged to hold about everything used in ordinary repairs. This picture, portraying as it does but one corner of the whole building, shows but half of the full equipment.

It does, however, show the radiator used for heating purposes. This is an ordinary radiator of large size, suitable for either steam or hot water, the writer not being sure which method of heating is utilized. Other radiators placed in the middle of the other sides (except the front), the same as this one is in the center of this side, act together to warm the whole inside very thoroughly. The heat is more necessary in this case than in the ordinary one, because the owner does all of his work here.

Although long and fairly wide, the pit in the foreground has been so foreshortened in photographing that it looks very small. This is not the case, the appearances being misleading, for the pit



Plan of Two-Car Garage With Complete Heating Plant

Elaborate and Efficient Heating Plant in Paterson Garage

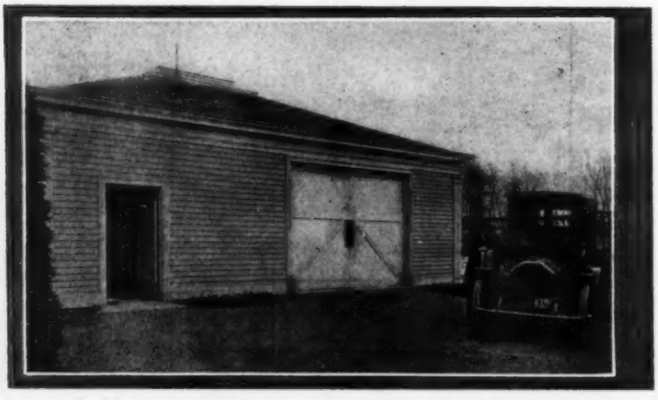
is slightly longer and somewhat wider than in the ordinary garage of medium size, say for two or three small-sized cars.

Electricity, of course, is used for the lighting, while the fire protection may be summed up in two words, hose and extinguisher. The former is not visible, but the latter (at least one of the latter) may be seen in the corner on the top shelf. This last-named is very important, since the building is a frame structure.

More Elaborate Heating System Shown in Plans—At the bottom of the same page is illustrated another garage, in which the heating arrangements are somewhat more elaborate. This one has living rooms above, so the heat furnished and the method of furnishing it must of necessity be more elaborate. As the plan shows, a whole room is given up to it, and another just outside of it to the fuel supply. A vertical boiler of large diameter supplies heat through pipes to three radiators on the car floor and two on the floor above. The three on the ground floor may be seen, one on the side nearest the observer and located close to the work bench, which is an excellent idea. The other two are placed equal distances apart on the other side, being actually located in front of the two windows on that side.

Many points other than the heating will be noticed here. The floor provides two pits, and one drain for washing purposes. Alongside of the bench and occupying the corner of that side with the front is a large locker. On the opposite side, also occupying the corner but much larger in size and capacity, is another locker, lettered closet in the drawing. This is a two-car garage, and built throughout of cement. The dotted lines across the floor show the drain pipes underneath the building, except in the case of the two pits. The dotted lines around these give some idea of the floor space which cars setting over the pits would occupy.

Perhaps the most ingenious thing about the whole garage is not noticeable in this drawing. This is the way in which the design provides several living rooms above, yet without going to the expense of carrying the building up to a second story. The ceiling of the automobile room is very high, but the ceiling of the open shed and boiler room is not; on the contrary, it is very low. This effects a saving in height, which, taken in conjunction with the space provided by the upward sloping of the roof at the center, makes a very large space. In fact, this space is large enough to give the chauffeur several rooms without skimping on them.

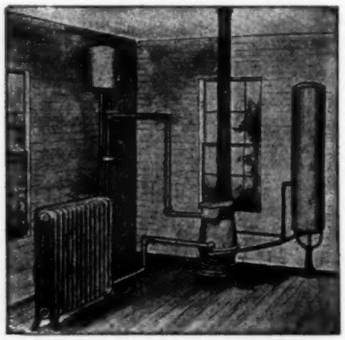


Frame Garages Require More Care in Selection of Heating

Small Hot Water Heater—The small cut on this page is that of an interior showing a small hot-water heating system now on the market. This is a special stove developed for the purpose, and, besides economy, has many good points. The stove itself has a deep, non-cleaning fire pot, circular in form and located within the one-piece base. The fire is entirely jacketed within the heater, so that none of the useful heat furnished by the fuel goes wrong. This in part accounts for the economy of the whole system.

Special shape of gratebars allow the use of any old kind of fuel, regardless of size or character. The complete system includes the radiator or radiators, small-diameter tank and smaller tank for the higher position, this providing assistance in the matter of water circulation through the action of gravity.

For heating, the upper tank is filled and the fire started. The water flows by gravity to the coils surrounding the fire pot, where it is heated. From there it proceeds to the circular boiler. This boiler acts as a source of supply from which the radiators are kept full of hot water. The vertically placed reservoir has no other function than to supply the radiators. In the whole system there are no valves or traps, the four parts of the apparatus being complete and self-sufficient when connected up by the plumber.



Compact Hot Water System

Reasons applicable to this outfit are equally applicable to many other hot-water systems, and, in fact, to nearly all fluid heating systems, including steam as a fluid. These are eight in number, as follows:

First—It will reduce the fire hazard to a minimum.

Second—It will eliminate the danger of freezing while in the garage of liquid-cooled cars.

Third—It will furnish hot water for cleaning purposes.

Fourth—It will last a lifetime.

Fifth—It will save you fuel.

Sixth—It will save you time and attention.

Seventh—It will reduce the repair cost on your car. You will have a comfortable place to work—the mechanism of your car will be kept better adjusted.

Eighth—It will keep your car looking better. You have hot water to clean the car—it will be done oftener and better.

One Garage's Very Admirable Heating Plant—One of the best and most complete heating arrangements for garage interiors which has come to the writer's notice is that pictured on this page. The strangest feature about this very complete and most admirable outfit is the fact that the car owned and kept in the garage is not a water-cooled machine, but an air-cooler, and as such not so susceptible to cold weather. Exception might be taken to this last statement on the score that air-cooled cars use more oil, and that, regardless of the cylinder cooling, the lubricating oil should not be allowed to congeal.

As is apparent, the furnace (its size makes that name necessary), located in an alcove so as not to reduce the actual floor space, supplies hot water to the radiators. The latter are arranged around the building, not at the floor line, but slightly above it. Their use is not restricted to any one side or part of the garage, but they are strung continuously around all sides, resulting in very efficient heating, and that, too, of a steady, even nature, so desirable in any heating system.

(To be concluded.)

POINTERS ON VALVES AND VALVE TIMING

By Arthur H. Denison

ADJUSTMENT and timing of the valves and the condition of their seats have much to do with the power developed by the gas engine. Cars that are constantly before the public, in racing and hill climbing events, have infinite care given to these details, and it is due to this care that races are won. The touring car, whether cared for by the owner or chauffeur, will give much better satisfaction, will develop better power and speed, with less depreciation and cost of upkeep, when cared for properly and kept in first-class order.

Valves are a necessity, in order that a suitable combustible mixture be passed into the cylinders, and the burnt products of combustion allowed to escape. Different forms of valves are in use, but in standard four-cycle engine practice, representing the great majority of American designs, the mechanically operated poppet valve, with either a flat seat or with an angle of 45 degrees is in use. Mechanically operated is not a strictly correct term, as the valves are merely opened by mechanical means and closed by the tension of a spring. If the spring is weak the valve will be late in closing. The springs in use on a modern high-speed motor vary greatly, but generally have a tension of about 40 pounds.

The cycle of operations of the engine is usually described as commencing with the suction stroke. A mixture of carburetted air—that is, air and hydro-carbon vapor—is forced into the cylinder through the inlet valve by atmospheric pressure as the piston travels downward on the suction or inlet stroke. At a point near the bottom of the stroke the inlet valve closes, and the piston, traveling upward, compresses the mixture to a pressure generally between 60 and 90 pounds. (Compressing the mixture enhances the value of the explosive pressure many times.)

Following the completion of the compression stroke, and the electrical contact that produces combustion, the piston is driven downward on the power stroke by the expanding gas. At a point near the bottom of the stroke the exhaust valve is opened, and the burnt products of combustion commence to escape. This valve is held open during the following up stroke of the piston. As the motor is developing power in but one stroke out of four, it follows that the most efficient motors are those that draw in and retain the greatest volume of gas on the suction stroke and get rid of the burnt gas with as little back pressure as possible on the exhaust stroke.

Gas Inertia Must Be Considered—All matter possesses weight, and one pound of air at a pressure of 14.7 pounds occupies approximately a volume of 1,488 cubic inches. It will therefore be seen that, possessing weight, it must, when traveling through the intake manifold and passages at speeds up to 10,000 feet per minute—some motors for racing work having reached a speed 50 per cent. greater than this—must possess a certain momentum or inertia that can be utilized to the motor's advantage.

When the piston is traveling at a high rate of speed, the gas does not flow into the cylinder the instant the valve is opened, nor can the column directly follow the piston head at its full density, owing to friction losses due to bends and walls of the passages. As some little time is necessary to start the flow, it is probable that the following is the actual condition of affairs.

In contact with the piston head is a region where there is practically no pressure, or approaching a perfect vacuum and above that a mixture of gradually increasing density, which at the valve probably would be at full atmospheric pressure. Were the inlet valve to close when it had reached the lowest point of its stroke, there would not be a mixture inside the cylinder that would fill it to near atmospheric pressure. One of the peculiar properties of gas is that it will always fill the volume it is contained in, regardless of the pressure, and the small charge trapped in the cylinder will have a lessened compression and explosive pressure value, thus affecting directly the power and speed of the car. In the manifold, the momentum of the column would cause it to ram against the head of the valve with an increasing pressure for an instant, then flow back out of that section of the manifold and disturbing carburetting conditions.

Timing Compensates for Gas Inertia—To take advantage of the momentum of the column of gas, it is customary to time the inlet valve to close when the greatest amount of gas is in the cylinders. The only accurate method of finding the correct valve timing involves the use of costly instruments in the engineering laboratory. When the piston passes the dead center, the crank shaft must travel quite a distance, measured on the crank circle before the piston has traveled an appreciable distance upward. Fig. 1 shows this, in crank-pin movements of 15 degrees.

General practice is to close the inlet valve 15 to 30 degrees.

After dead center, it having been found that the influence of the piston traveling up was, at the point where the valve closed, just sufficient to balance the momentum of the column of gas coming in through the inlet port. Any further opening of the valve would allow part of the charge to be pushed back out through the open port. It must be remembered that the valves are timed to give the engine the greatest power at a certain speed. When a valve opens or closes after dead center, as in the case of the exhaust valve closing, followed by the inlet valve opening, both are said to have a *lag* of "X" degrees. An exhaust valve opening before dead center has a *lead* of "X" degrees.

The exhaust valve is opened from 30 to 60 degrees ahead of the crank dead center. The drop in the pressure is very rapid during the first half of the stroke, after which it is not very effective as a means of developing power. Opening the valve before the dead center allows the gas to expand to near atmospheric pressure by the time dead center is reached and on the exhaust stroke, the piston has a comparatively small amount of gas to force out. Were all openings in the exhaust line to be stopped up, the pressure of the exhaust gas would become so great in a short time that the motor would stop. The exhaust valve closes at dead center or a few degrees after, taking advantage of whatever momentum is in the gas in order to carry out as much as possible. The opening of the inlet valve should follow very closely the closing of the exhaust valve, but both should not be open at the same time.

Manufacturer's Part in Correct Timing—When a car leaves the factory for delivery the motor timing gears and flywheel should be so marked that trouble will not follow if the

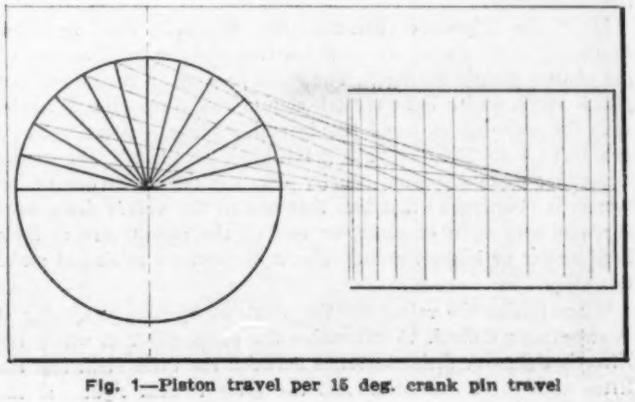


Fig. 1—Piston travel per 15 deg. crank pin travel

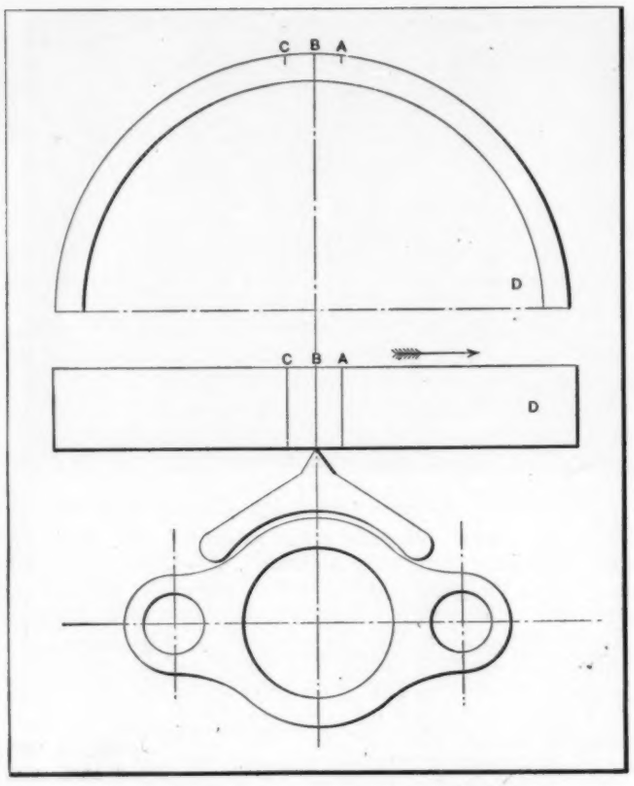


Fig. 2—Method of using indicator to time valves

gears are carelessly removed. Much of the trouble and dissatisfaction at repair and overhauling work is probably due to original valve timing by the mechanic who has been experimenting with gears that were not marked. There may be two, three, four or five gears in the timing case and all should be carefully marked, not with the nearest cold chisel or center punch but with a set of figures or letters. The tooth of one gear and the space of the one that it is in mesh with should be clearly marked with the same symbol, and that symbol used only once.

If there are two gears of the same size in the case as the magneto and pump shaft gears, and placed at opposite sides of the case, stamp the gear and shaft also to prevent getting them mixed up. Carelessness there may result in the gears being meshed otherwise than the way they have been fitted, and they may run noisy. If a gear is held with two keys, 180 degrees apart place symbol marks so that the gear can be readily replaced and the symbol marks coincide. Cam shaft gears may be bolted to a flange on the shaft, and both the shaft flange and the gear should be marked so that the gear can be readily replaced correctly. Were the factory to mark the gears thus, the multitude of scratches and marks often seen would not be needed, nor eccentric and original valve timing cause low powered or overheated engines.

How the Flywheel Should Be Marked—The flywheel should have the timing of all the valves and the head centers of the pistons plainly marked. The mark may be an arrow head or punch mark, and a light scratch should run across the flywheel, with the meaning stamped beside and reading, for example, "1 & 4 INLET OPEN," or "2 & 3 HEAD CENTER." The marks mean that when a pointer, usually placed in the center line of the motor, is pointing to that line that one of the valves designated is starting to open or close, or two of the pistons are at their head center or highest point. Fig. 2 illustrates and should make this clear.

When testing the valves for the points of opening or closing, it is sometimes difficult to determine the exact point at which the lifter is tight. A little clearance between the valve stem and the lifter allows for expansion and the valve to seat tight. If the valve lifters are not spring controlled, the least rattle or shake can be readily detected with the finger, or if this method is not practicable a cigarette paper is the thinnest piece of material to be had, and this may be placed between the valve stem and the lifter. When it is tight the valve may be considered as starting to open.

Correct Valve Lifter Clearance—Valve lifters should be set so that every valve stem has the same amount of clearance. One-thirty-second to 1/64th of an inch is generally sufficient, and more than this will make the motor noisy. A piece of steel or brass of this thickness may be readily obtained, and, placed between valve and lifter, will allow adjustments to be made quickly and easily.

If the motor gears are apart and gears and flywheel not marked, the following is probably the easiest method of replacing the gears so that the motor is timed right. First, place the piston of No. 1 cylinder on its head dead center. This may be found by running a wire through the compression tap or noting the position of the cranks, etc.

Consider a motor with a single cam shaft.

The first cam generally operates an exhaust valve, and this should close at or a trifle after dead center. The cam shaft should be turned until as near as possible in its correct position and then the gears meshed. If two cam shafts are used, one for the inlet and the other for the exhaust valves, the piston does not need to be moved, as the inlet valve must open a few degrees after the other has closed. Then measure the piston travel and find when the valves open and close.

Unless the cams have been removed from the shaft, it is safe to assume that, with the proper opening of the inlet valve and proper closing of the exhaust valve, the other points of operation for the valves are correct. If the exhaust valve closes either at head dead center or within an inch and a half after, and the inlet opens right after the exhaust closes or within a distance of not more than two and one-half inches past the dead center mark, the valves may be assumed to be correctly timed. The measurements are made on the rim of the flywheel, and the above figures are for large-size flywheels.

How a Timing Diagram Is Laid Out—When considering the power output of a motor as low and due to defective valve timing, the flywheel is not marked, and the marks on the gears unreliable, the best thing to do is to make a diagram of where the valves are actually opening and closing. With a compass lay out a circle, of any convenient diameter to represent the rim of the flywheel, and draw the vertical diameter, which will represent the head centers. With whatever means practical find out the time of the inlet valve opening.

Suppose it opens one-quarter of an inch after the piston has passed the dead center and is traveling downward. If the stroke of the motor be considered as five inches this would be 1/20th of the stroke, and measured in degrees 180/20, or nine degrees. With a protractor lay off nine degrees on the circle past the dead center point. Then take the point of inlet valve closing, and suppose it to be one-half inch after the lower dead center. This would represent 18 degrees, and lay this off on the circle in the same manner. Then treat the opening and closing of the exhaust valve in the same manner, and the result would be a diagram like Fig. 3.

Here the exhaust valve has been supposed to open one inch before the lower dead center and to close one-eighth inch past the upper dead center. A glance at the diagram will show that the motor is timed correctly, according to the principles of valve timing. Were the gears meshed one tooth off, it would affect the time about three or four inches on the flywheel rim. Either the exhaust valve would close before center, thus retaining a certain amount of the dead gas and weakening the mixture, or if it closed that amount late, it would likewise open late and make the motor run much hotter, as it would be subject to the heat of the gas for a longer time. The inlet would remain open so late that part of the gas drawn in would be pushed out through open port when the piston should be compressing the

gas with the valves closed. Or on the other hand, it would close too early, which would result in a scanty charge being drawn into the cylinders. In actual latter-day practice, the inlet is held open a small amount of the compression stroke, so as to take advantage of the inertia of the inrushing gas, this being sufficient to overcome the slight compression effect produced for the initial 5 or 10 degrees of crank movement past the lower dead center. In some modern engines, this lag of the inlet valve amounts to as much as 40 deg. and more. Thus, Peugeot uses 58 deg., Panhard 45 deg., and De Dion 45 deg.

Why Exhaust Needs Grinding More Often Than Inlet—Exhaust valves, in particular, generally require frequent grinding in. It is a common practice to slow the motor when the car is stopped by closing the throttle and retarding the spark as much as possible. This allows ignition to take place after the piston has passed dead center, and the gas burns slowly, both exposing more of the cylinder walls to the great heat, and also retaining most of its heat till the exhaust valve opens. Thus both the valve and its seat are subjected to a temperature almost great enough to melt the iron were the heat applied continually.

Intermittent bursts of flame serve to warp the valve and make the task of grinding it to a tight fit one of great difficulty, or the valve may be too far gone and a new one needed. Valves may be ground in with emery or carborundum floor and oil, or one of the many preparations on the market for this purpose. A soft lead pencil or a little blue will serve to test the bearing of the valve on its seat. The valve should be ground to hold gasoline.

Valve springs may lose their temper and fail after long use, causing the motor to be sluggish. A good test is to place a washer under the valve spring, thus materially increasing tension.

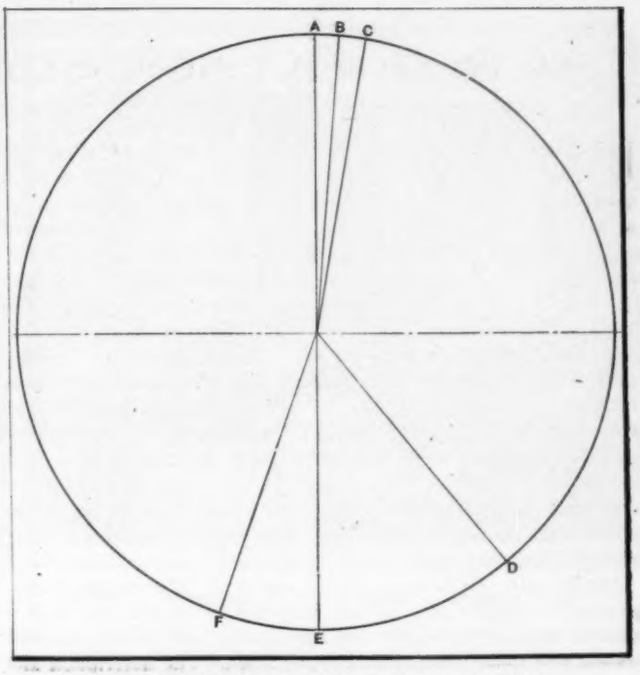


Fig. 3—Principles of valve opening and closing

OIL CONSUMPTION IN THE FRENCH COMMERCIAL TRIALS

By W. F. BRADLEY

PARIS, Dec. 9—Speed, reliability and simplicity are features that have been very closely studied in the modern automobile, but comparatively little attention has been paid to economy. This is doubtless due to the fact that the greatest development of the automobile has been as a pleasure vehicle, the owner of which, although keen to get the greatest value for his initial outlay, pays little attention to the daily and comparatively small expenditure for gasoline and lubricating oil. There are not many owner-drivers who can state off-hand the mileage per gallon of their cars, and still fewer who know exactly how many miles they can run with a pint of lubricating oil. It is only necessary to see the pools of oil left by most cars after standing to realize that the owners and manufacturers are often as careless as they are ignorant on this point.

Even in Europe, where the high rates of gasoline and greater price of lubricating oil, compared with the United States, leads to greater economy in their use, the matter has not received anything like adequate attention. Lubrication methods, however, are far from being perfect, as can be judged from the official results in the recent French commercial vehicle trials. For the first time in any competition an accurate control was maintained on oil and grease as well as on the various fuels used. The test was a really practical one, for it was spread over a period of thirty days and for a road distance varying up to 2,000 miles.

The small number of entries makes it impossible to draw any general conclusions except in one class, devoted to trucks carrying a useful load of between two and three tons. Without entering too closely into figures, it may be stated that the actual load, exclusive of tools and spares, was in every case only a few pounds short of three tons. The vehicles made twenty-four journeys, over various kinds of roads, and under varying weather conditions, the total distance covered being 1,794½ miles.

The best performance was made by a four-cylinder Saurer, which, during the month, consumed 37.7 pints of lubricating oil and 2 pints of grease. This means that 47.8 miles were covered for each pint of lubricating oil. In the official table the grease consumption is, curiously, given in pints, instead of in pounds. This item, however, can be ignored, for in every case but one the consumption did not exceed 3 pints for 1,794 miles.

Thirteen vehicles are included in the official table, these having gone through the month's trial with a clean score so far as regularity is concerned. The average oil consumption was at the rate of 1 pint per 16.4 miles. The Saurer, which held the record with 47.8 miles on a pint, and incidentally won first prize for all round economy and efficiency, was followed by a duplicate vehicle with 34 miles to a pint. A De Dion was also very economical with 25.4 miles to a pint of oil. A two-cylinder Delahaye, which obtained second prize on formula, running the Saurer very close, evidently lost first prize entirely to neglect of economy in lubricating oil. It was the most economical in fuel, whether it was gasoline, alcohol or benzol, but it required a pint of lubricating oil every 12.9 miles.

The value of the test is shown by the fact that whenever there are two similar vehicles from one factory their oil consumption was practically the same, thus showing that it was a test of systems, and not a mere exhibition of the ability of the driver skilfully to economize without risk to his motor and transmission. The test also proved conclusively that constructors had not paid sufficient attention to economical lubrication, otherwise we should not see differences of over 100 per cent. under identical conditions of operation. The following table sets forth the amount of oil consumed for a total distance of 1,794.5 miles and gives the mileage obtained on a pint of lubricating oil. The vehicles were run at an average speed of not less than 9 nor more than 15½ miles an hour.

	Total Miles	Oil in Pints	Miles per Pint
Saurer, 4-cyl., 4.3 by 5.5 ins.	1794.5	37.7	47.8
Saurer, 4-cyl., 4.3 by 5.5 ins.	1794.5	52.8	34.0
De Dion, 4-cyl., 3.5 by 3.9 ins.	1794.5	70.4	25.4
Vinot, 4-cyl., 4 by 5.5 ins.	1794.5	107.2	16.7
Aries, 4-cyl., 3.3 by 4.3 ins.	1794.5	132.0	13.5
Delahaye, 2-cyl., 3.9 by 7.08 ins.	1794.5	135.5	13.3
Delahaye, 2-cyl., 3.9 by 7.08 ins.	1794.5	139.0	12.9
Peugeot, 4-cyl., 3.5 by 4.7 ins.	1794.5	140.8	12.7
Vinot, 4-cyl., 4 by 5.5 ins.	1794.5	149.6	11.9
Aries, 4-cyl., 3.3 by 4.3 ins.	1794.5	161.9	11.08
Panhard, 4-cyl., 3.5 by 5.1 ins.	1794.5	241.2	7.4
Malicet & Blin, 4-cyl., 3.5 by 4.7 ins.	1794.5	260.5	6.8
Cohendet, 2-cyl., 5.7 by 5.7 ins.	1794.5	602.18	2.9

AN INEXPENSIVE HOME-MADE ELECTRIC LIGHTING SYSTEM

By VINCENT B. MINER

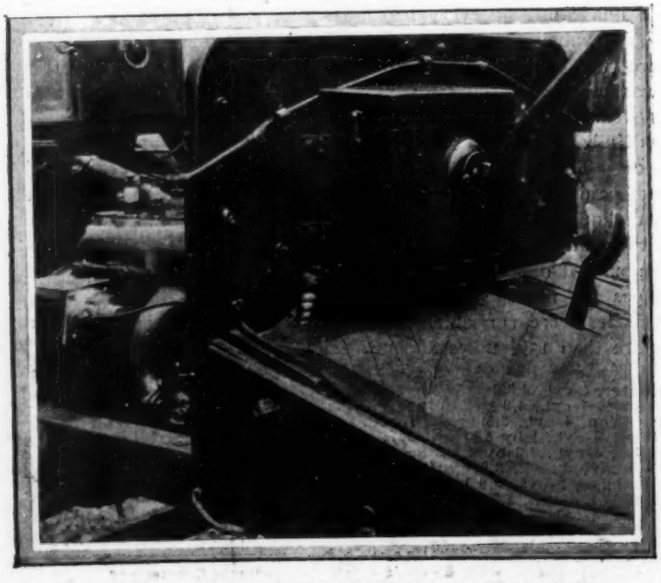
BECAUSE of the antics of a poorly designed kerosene rear light, which would stay lighted only with the flame at a ridiculous height, the writer was moved to plan the installation of an electric light at this important point. The idea expanded in its execution to include the two sidelights, also of the kerosene species. It may be well to mention that this system was not intended to replace headlights or searchlight (which would have greatly increased the cost on account of expensive parabolic reflectors), but was intended to supersede the ancient, dirty, uncertain and weak battery of kerosene lamps. As it was a total experiment, so far as the writer was concerned, the expense was to be somewhat limited. As a result of careful simplification, the cost of the complete outfit was kept at $2.91, and the time to install at half a day. Retail prices were paid for everything; and, with the possible exception of the lamps themselves, each article was standard and easily obtainable at any electrical supply store.

Almost any low-tension direct-current or alternating-current generator designed for ignition purposes in conjunction with a vibrator coil, or a six-volt storage battery, will suffice for this system, and their possession is presupposed. The description and directions which follow are intended for those who are using the generator; for those who possess a storage battery only the sole difference would be to tap the wire leading from the storage battery to the coil, instead of the wire leading from the generator to the coil. The writer is using a Western-made, belt-driven mechanically-governed, direct-current generator, which keeps all lights brilliant, even at the lowest possible engine speed.

Purchase the following:

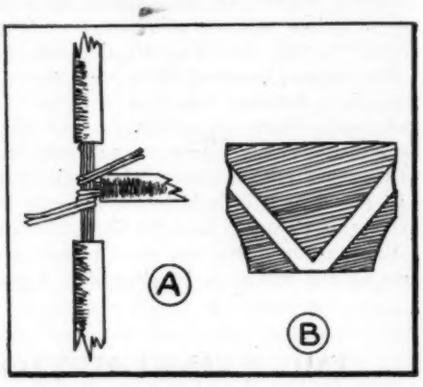
2 6-volt 6 candle-power anchored filament tungsten lamps, minimum base	$1.50
1 single-pole porcelain-base snap switch	.20
2 miniature receptacles, porcelain base (depending upon oil-lamp body)	.21
8 feet ¼-inch internal diameter flexduct	.48
3 porcelain cleats (to fit large wire)	.10
1 small can paint (color of car)	.10
12 feet No. 14 D. B. stranded wire, rubber-insulated ("large wire")	.16
6 feet No. 22 S. B. rubber-insulated copper wire ("small wire")	.06
Screws for cleats, switch, and receptacles (fit each) about	.10
	$2.91

The desired position of switch on the dash is first selected, after which the generator wire to the coil is tapped at the nearest or most convenient point to this switch. At this spot about an inch of insulation should be removed, also the same amount from the ends of the large wire. Make the joint as shown in sketch A. After taping thoroughly run this wire over to the switch location and cut, allowing sufficient to go up through the switchbase and connect on the switch terminal. Connect this wire to one switch terminal. Connect one end of the remaining large wire to the other switch terminal, being certain that switch is turned off. Now firmly screw switch to dash at previously determined point. It will now have to be decided whether the wire from switch to sidelights is to run across the top or bottom of the dash.



Cross Wire on Dash, and "Flexduct" Coming Through Floor

Estimate the distance from the switch to the proposed line across the dash, allowing an inch or two over, and at this point cut the second wire leading from the switch. We are now ready for the dash wire leading to the two sidelights. Run this a little out beyond the dash on both sides, having each end leave the dash as near as possible to its respective lamp. Where the dash is surrounded by a dash hood it is necessary to bore holes through same at points near the lamps for the passage of this cross-wire. Be sure to tape the wire well where it runs through these holes, so as to prevent the insulation from chafing. Now secure this cross-line with one cleat placed about the center of the dash. Tap the cross-wire at a point nearest the switch, connecting the short wire from the switch thereto, as illustrated in sketch A. With the aid of two more cleats firmly secure this cross-wire all along the dash.



Sketches of Wire Connection and Plug

We are now ready for the rear-light line, which taps this dash cross-wire, running through conduit to the rear light. Bore hole slightly larger than the conduit in rear end of body at a point exactly opposite the rear lamp. Bore a similar hole in the footboard nearest the dash at a point nearest where it is desired to tap the dash cross-wire. Suspend the conduit along the frame or body, whichever seems most expedient, thrusting the ends through the previously bored holes—the rear conduit end being flush with the rear of the body. Now lash conduit securely to frame by means of very heavy tarred twine or tire tape, or secure it by means of a few U-shaped metal straps. Cut off any surplus conduit which may show at the dash to a point about one inch above the footboard and mat. Run the large wire through the conduit, starting from the rear end. Tap dash cross-wire at point of intersection with this rear conduit wire, as shown in sketch A, and cut at rear end, allowing about 2 inches to project for connection purposes.

Now Ready for the Lamp Connections—Upon attempting to give directions for the successful and easily performed installation of electric lamp receptacles or sockets in the former oil lights, the writer is confronted with the widely varying types of oil lamps now in use. At no part in the construction of this system is it possible to use more ingenuity than in the adaptation of the small porcelain receptacle or socket to the available apertures, or lack of same, in the oil lamp. If the reader has an oil fount and burner which is removable as a unit, as has the writer, he has a "cinch," for the hole left by its removal is a quick way out of possible trouble. However, the writer's rear light has a permanent wick guide or holder, which necessitated an entirely different method of treatment.

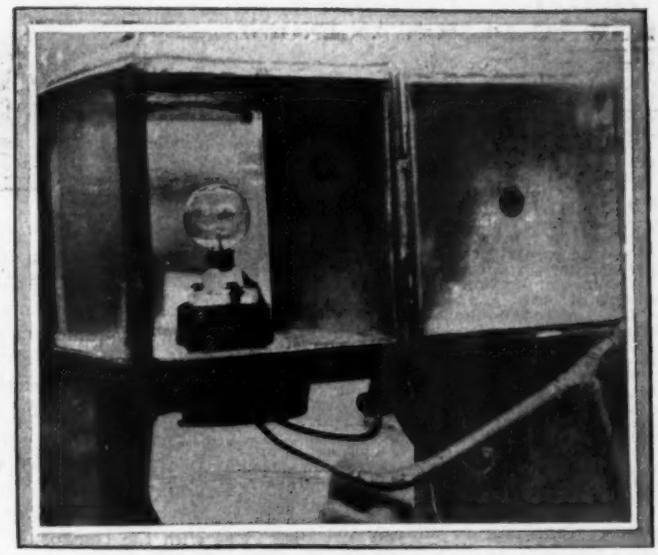
First, the sidelights. When the fount and burner unit is removed it leaves a circular hole. Two wooden plugs of slightly larger size than the lamp aperture are tapered down to a diameter slightly smaller than the aperture, the top of the plug being flat to accommodate the receptacle, thus (B). This may best be done in a lathe, but can be easily whittled instead. The reader will now find that these plugs will fit in the lamp apertures very tightly—no amount of rough driving will jar them loose. Two holes are then drilled in each plug diagonally, starting from opposite sides of the plug above the tapering portion to the center of the bottom, these holes being slightly larger in diameter than the small wires (see B). Paint these plugs to correspond with the color of the car, at the same time painting the porcelain cleats holding the dash cross-wire. After drying attach the porcelain receptacles to the tops of the plugs with small screws, taking care that the two terminals of the receptacles correspond with the two side holes of the plugs. Now measure distance from end of dash cross-wire to one terminal of receptacle when plug is in place in lamp. Allowing a little for connection and slack, cut off this amount of the smaller wire; attach one end to receptacle and thrust other end through diagonal hole, out through base of plug.

At this stage it must be determined what part of the dash is to act as the "ground," or return circuit. As shown in the photographs, the writer's car has a brass bead completely around the edge of the dash, which forms the best possible kind of a conductor. The screws used to secure this bead to the dash are made to act as the binding posts for the ends of the return wires from the respective lamp plugs. Practically all cars now have metal dash hoods which serve the purpose admirably, it being merely a matter of the owner's desire as to just how he wishes to connect his second or return wire from each lamp to the metal conductor. The rear lamp connection can be secured to the frame at some convenient nut or fastened in some secure manner to the body, if the latter be of metal. Boring two small holes 1-2 inch apart and looping wire through them is a satisfactory method. Measuring distance from lamp receptacles to point of ground, connect these two points, also connecting the end of the dash cross-wise with the first small lamp wire. Take care to tape all connections. We are now ready to connect our "ground" dash bead, dash hood or body to the frame (to complete the electrical circuit), unless this be already done by bolts. Do this by means of a piece of the large wire running from one of the above-mentioned grounds to the frame. The photograph shows clearly how the writer accomplishes this object; the invisible end being connected to a transmission bolt. On many cars this job will be unnecessary and may be left until the last, as a test with a set of dry cells will quickly disclose the presence of an established connection or the lack of it. Our wiring is now complete.

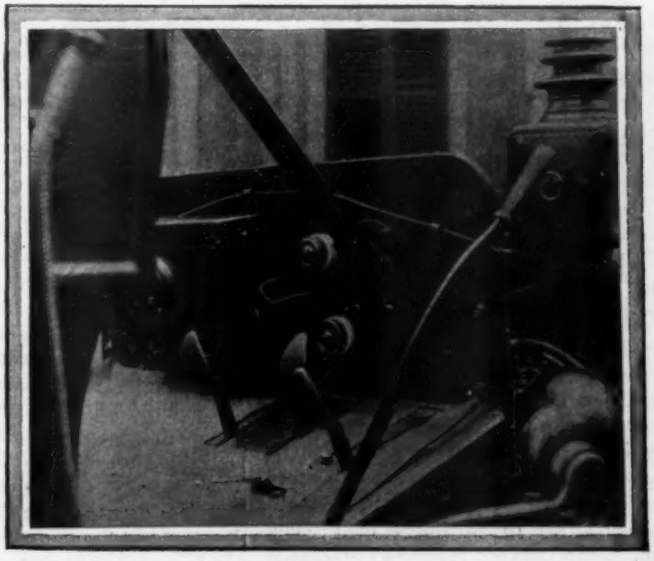
Place the lamps in the receptacles, taking care to screw them up quite snugly. Now cut about 10 inches of tire tape in half, lengthwise. Wrap this tightly about the base of each lamp and top of its receptacle, securing the end on the plug. This is to prevent the lamp from jarring loose. After the writer had first installed this system he was made painfully aware of the insecurity of the plain receptacle thread by hearing the electric bulb dancing around the lamp body. This treatment, incidentally, never feazed the anchored filament of the lamp.

Now for the test. Start engine, turn coil switch to generator (or storage battery), and turn on light switch. If lights fail to burn, go over the whole wiring for a loose connection. If there is a short-circuit the engine will stop when the coil switch is turned from starting battery to generator (or will fail to start in the case of a storage battery). If only one or two lamps burn, the remedy for the remainder is obvious. Up to this point an alternating-current generator is as good as one giving direct current.

To the above system used in connection with a generator there is only one genuine objection: no light when the engine (therefore, the generator) is at rest. If the owner runs his machine off the road into a yard or enclosure while not in use away from home, the above objection fails to hold. Otherwise (and in the great majority of cases) some permanent source of current is indispensable. Therefore, enter the storage battery and, correlatively, the direct-current generator. Upon inspection of one of the photographs the reader will notice a second switch—of the indicating variety. One side of this switch is connected directly to the generator, the other taps the light line between the coil connection and the light switch, thereby controlling the connection between the generator and the coil. From this generator or coil connection runs a second wire to the battery box, wherein the writer intends shortly to place a storage battery, the second connection of the storage battery being grounded on the frame. Thus, the second switch controls also the connection between the generator and the storage battery. So wired, either the storage battery or the generator may be used for ignition or lighting, or both. Or the generator may be switched against the storage battery, thus, during day-time running, charging the battery. In this case be sure to turn off the second switch before stopping the motor, otherwise the storage battery current would short-circuit through the generator, demagnetizing the fields of the latter, and discharging the battery. This extra switch and wiring raises our total cost to $3.22.



Detail of Connection to Lamp, Showing Wooden Plug



Dashboard with Extra Switch for Battery Connection

HOW TO DESIGN AN ENGINE

Editor THE AUTOMOBILE:

[2,117]—Will you please answer the following questions relative to a gasoline engine in the columns "Letters Interesting, Answered and Discussed?"

1. (a) At what point in the stroke does the gas attain a maximum pressure; (b) what is this pressure in pounds per square inch; (c) what is the temperature in degrees Fahr.?

2. (a) What proportion do temperature and pressure of exhaust gas in a water-jacketed exhaust pipe bear to the above mentioned temperature and pressure, i.e., in what proportion does it decrease?

3. What proportion of its volume will water absorb of burnt gas?

4. (a) What is the density of the proper mixture of gas before entering the cylinder; (b) after explosion and when exhaust port is opening?

5. (a) To what volume would exhaust gas from a single cylinder 4 in. by 5 in. motor expand before being reduced to atmospheric pressure if exhausting into open air; (b) if exhausting into an enclosure?

I am working on a single cylinder 4 by 5 motor and trying to incorporate new ideas.

Birmingham, Ala. E. V. SMITH.

Your questions are rather broad and it hardly seems fair to take up the space in the paper to tell you how to design an engine, or to go into the deeper and more abstract features about which you ask, but we will try to give you an answer.

1. (a) The gas attains its greatest pressure at the time of explosion, this time varying with the speed of the engine and the amount of lead given the spark. It varies from 30 deg. before dead center to about 20 deg. after, both being measured upon the crankcircle.

1. (b) No hard and fast rule can be given, which is not very involved. Four times the compression pressure is about right. 75 lbs. compression will yield 300 lbs. explosion.

1. (c) The temperature varies with the pressure and volume, the equation involving volumes and temperatures being:

$$T_b = T_a\left(\frac{V_a}{V_b}\right)^{\lambda-1}$$

in which T_b is the temperature at the end of the expansion, assuming this to be adiabatic expansion

T_a is the temp. previous to expansion.

V_a is the volume previous to expansion,

V_b is the resulting volume, and

λ is the ratio of specific heats, this being taken as 1.35 for adiabatic expansion.

Barring only the value of the exponent, this same equation answers also for the compression stroke, the figures for that not having been determined very accurately. The same figure may then be used for the sake of immediate computation. If then, T_a be taken as atmospheric pressure (counting always the absolute temperature), the equation assumes the working form of:

$$T_b = 529\left(\frac{V_a}{V_b}\right)^{.35}$$

Using this, for your purpose, you have but to substitute the initial volume of the cylinder contents and either the final volume or temperature, to obtain the other.

In case it is more useful to you to have the relation of pressures than temperatures, the equation is:

$$P_b = P_a\left(\frac{V_a}{V_b}\right)^{1.35}$$

By substituting in this any known volume of the gas on the expansion stroke, the pressure at that time may be figured. This answers questions 2 (a), 5 (a) and 5 (b).

Your other questions as to absorption of gases by water and density of mixture would call for too much space, going as they do deep into the realm of chemistry. In the former case the amount of absorption would vary with the composition of the exhaust gases, which in turn will vary with the composition of the original mixture and the amount or completeness of the combustion. As to the latter case, question 4 (a) and 4 (b), both densities vary with the chemical composition of the gases at those two points as well as their temperature at that time.

All these questions and many more you will find discussed in great detail in the many excellent works on the subject of gas or gasoline engines, among which may be mentioned: The Gas Engine, F. R. Jones; The Gas and Oil Engine, by Clerk; Gas Engine Design, by Lucke; The Gas Engine, by Hutton, and a new book, Carburettors, Vaporizers, and Other Fuel Vaporizing Devices. Any or all of these may be obtained from The Class Journal Company, 231 West Thirty-ninth street, New York City.

USE AND ABUSE OF GRAPHITE

Editor THE AUTOMOBILE:

[2,118]—Will you kindly advise through the columns of your esteemed publication, whether or not it is considered good practice to sprinkle powdered or amorphous graphite on the wearing surfaces of bevel gears and transmission gears for the purpose of polishing same and filling microscopical indentions in the gears. Also kindly advise whether or not it is considered good practice to mix graphite in with other lubricants for transmission or bevel gear lubrication. If so, will you kindly give me a good formula for such a mixture? Kindly advise what steps can be taken to reduce the noise of the gears to make the car run absolutely noiseless. There is a certain kind of hum which seems to be in transmissions, which I should like to eradicate if possible. The car I have in mind is equipped with Timken rear axles, with pressed steel housing, and Cotta Transmission. F. W. B.

Dallas City, Ill.

Yes, this is good practice, although it is something which is seldom done. When graphite is used with other lubricants, the amount utilized is very small, thus, with oil, one tablespoonful of graphite to one pint of oil used. Similarly, with grease a tablespoonful to about 2 pounds of grease would be plenty.

In last week's paper, you will find in answer to a letter (2,110) that boxwood saw dust and heavy grease or sawdust in graphite makes a very good noise deadener for gear boxes. It is doubtful if all noise can be eliminated.

HIGH AND LOW COMPRESSION

Editor THE AUTOMOBILE:

[2,119]—Will you kindly answer the following questions in your "Letters Interesting, Answered and Discussed?" Which is best for high speed work or racing, a moderate compression of say 65 to 70 pounds or a high compression of 110 or 115 pounds? Why is it that automobile manufacturers do not put heavier flywheels on their engines so that they would run steadier at slow speeds? It seems to me that if they would put on heavier flywheels there would never be any need for more than four cylinders. Also, I would like to know how pure castor oil would be for the lubrication of the cylinders of an automobile, nearly all the oil men tell me that it will not do, as it is a vegetable oil, and that it takes a mineral oil.

Great Bend, Kan. A SUBSCRIBER.

For several years the compression pressures in general use continued to increase until they reached a figure of about 90 pounds in ordinary touring cars, and many pounds higher for racing cars. This pressure was found to have so many disadvantages that it was but a very short time before the backward movement began, and is still continuing.

To-day, the tendency is to use a fairly low pressure, or what would have been called low several years ago, say about 60 pounds. This results in an engine which anybody can crank without first arranging for the coroner and undertaker, as was the case with the higher pressures. Not only that matter of personal convenience, but the higher compression resulted in higher explosion pressures, which in turn acted to tear the motor apart with great rapidity. So, it came about that the higher compression motors were not only dangerous to crank, but very costly to operate as well, the repair charges being very high.

Flywheel weight is dead weight, which makers are very doubtful about the utility of, this being added to the dead load on the tires without enough advantages to compensate for it. Thus, with a very heavy, say unusually so, the tire wear will be about double what it is ordinarily. The question then arises if the additional weight is worth that much. We grant you, however, that a moderately heavy flywheel is all right, but believe that nearly all makers are using that kind.

On the subject of castor oil, you are referred to the discussion, which was printed in these columns some time ago, about five months ago, to be exact. Both sides of the perplexing question were then taken up, and discussed exhaustively.

To be exact, letter 1,948 in the July 22 issue started the discussion, this being favorable to the use of castor oil. Following that, in the Aug. 19 issue, there was published a letter from the Joseph Dixon Crucible Co. denying the benefits of its use, and advocating graphite as superior.

MAKER'S OPPORTUNITY

Editor THE AUTOMOBILE:

[2,120]—I am looking for a 1910 two-seated roadster, about 24 to 30 horsepower, weight about 1,600 pounds, road clearance say 10 to 12 in., body set low, 110 to 112 in. wheelbase, selective type of gear shifting, cost from $1,000 to $1,500. Can you put me into communication with the manufacturer of such a car? MAC.

New Rochford, N. Dak.

From the tables published last year at the time of the New York show in THE AUTOMOBILE, we have selected the following cars which seem to meet most of your requirements. Others are invited to write us and the name of this party will be furnished.

Overland ...	$1,250	25.6 h.p.	100 w.b.	1,800 wt.
Kissel Kar..	1,350	30	107	2,000
Cameron II..	1,500	36	112	1,600
E-M-F 30...	1,250	25.6	106	1,800
Chalmers 30.	1,500	24	110	.....

Of these the Cameron is of higher power than you want, being a six-cylinder, but is given on account of meeting the weight requirement so closely, this being the stumbling block in your case. The changes for this season are: Cameron, wheelbase to 114, and weight to 1,675; Chalmers, power to 25.6, and wheelbase to 115.

Following is another list of 1910 cars, which in addition to the above, seem to meet most of your requirements:

Black Crow.	$1,200	24.0 h.p.	107 w.p.	.....
Clark	1,400	25.6	110	.....
Illinois	1,250	25.6	107	2,000 wt.
Jackson	1,250	25.6	105	1,950
Johnson	1,500	28.9	112	2,200
Marathon ..	1,500	28.9	112	.....
Maxwell	1,500	28.9	108	2,500
McIntyre ...	1,250	27.2	112	.....
Middleby ..	1,250	25.6	108	2,200
Mitchell	1,100	28.9	100	.....
Moline	1,500	25.6	110	.....
Moon 30 ...	1,500	28.9	...	.....
Overland ...	1,400	28.9	112	2,200
Parry	1,285	28.9	*114	.....
Regal	1,250	25.6	107	1,900
Reo	1,250	25.6	108	.....
Rider-Lewis.	1,050	25.6	100	1,700
Everitt 30...	1,350	25:6	110	.....†

*Prob. †Clear. 11½.

SUGGESTS NOMENCLATURE

Editor THE AUTOMOBILE:

[2,121]—Isn't it time for some linguistic genius to arise and offer a suitable set of names for magnetos and magneto systems by which the present confusion and lack of accuracy might be avoided? Imagine a school teacher (automobile school, of course) asking his pupils to define a "high-tension" magneto. It is said that grocers classify the staple product of the hen into fresh eggs, strictly fresh eggs, and "just eggs." In the same way we have the high-tension magneto, "true high-tension magneto," and the plain "magneto," which usually satisfies the novice.

The trouble appears to arise from the fact that, while the spark ultimately produced is of the high tension variety in nearly all cases, the magneto in which the impulse originates may be either high or low tension. What the user is mainly interested in is the spark rather than the magneto, since the latter is only a means to the end. Consequently, when asked what ignition system he has or desires, he replies "high tension," as if that ended the matter.

To those in the trade, however, the matter is not so simple. Distinction between types is necessary, and it does not seem more reasonable to describe a magneto according to the ultimate spark than it would be to name the style of carriage according to the breed of horse that happened to pull it.

A magneto containing within itself the elements necessary for producing a high tension spark is fairly described as a high tension magneto, and its makers should not be driven to such verbal shifts as "arc light," "arc flame," or the prefix "true" to indicate his meaning, any more than the automobile builder should be required to prefix "actual" before his horsepower rating.

The real need seems to be for some phrase to describe the type of low tension magneto whose current is delivered to a step-up coil and there transformed to high tension. To call it "low tension" without explanation is impossible, and "low tension with separate coil" is equally so. Why not simply name it the "coil type" magneto, leaving the jump spark to be inferred? Belt driven magnetos having separate coils could then be described as "non-synchronous" magnetos.

A similar need exists for verbal distinction between the various dual, semi-dual, and hemi-demi-dual systems now on the market. Probably at least half a dozen could be counted, ranging all the way from that using the same interrupter, coil, distributer and plugs in both systems up to the only real dual system having the magneto and battery circuits entirely separate, even to the spark plugs. The weight of practice seems to be divided between the real dual system and the system which uses the same distributer and spark plugs, but with separate interrupters for the two circuits and a special coil for the battery circuit. The writer confesses himself staggered by the problem of finding a name even for the second of these two, but some one ought to find it, and when found it ought to be adopted.

New York City. HERBERT L. TOWLE.

CONCERNING WING TIPS

Editor THE AUTOMOBILE:

[2,122]—I am much interested in aeronautics, and have been reading your articles right along. However, I am puzzled to find what you mean by wing tips, and can find nothing about them. I would like you to advise me as to how to get information. ANSON BILGER.

Oakland, Cal.

To use what may seem a Hibernicism, a wing tip is the tip of a wing. More exactly, it is the outer portion, say about one-third, of the supporting planes of an aeroplane. These outer portions, or tips, differ from the rest of the supporting planes in being flexible. The planes are inclined to the horizontal at an angle of from 5 to 10 degrees, and this angle is fixed according to the judgment of the designer. The tips, however, being flexible, can be set at will at either a larger or smaller angle. A larger angle means a greater lifting effect, although involving at the same time greater resistance to forward movement through the air. If a sudden current of air causes the aeroplane to tilt to one side, the aviator sets the wing tip (or tips, according as the machine is a monoplane or biplane) on the lower side at a greater angle, and decreases the angle of the tips on the side which the current is lifting, and thus brings the machine back on a level keel. In the Wright machine this feature is the subject of a patent, which seems to cover all forms of the warping (as it is called) now in ordinary use on aeroplanes.

TROUBLESOME CARBON

Editor THE AUTOMOBILE:

[2,123]—Kindly publish under "Letters Interesting, Answered and Discussed" your idea of the cause and remedy of the following trouble:

My four-cylinder Winton XIV is fed to the cylinders equal amount of oil as the sight feed would indicate. The oil is cut down as low as safety will permit.

The car after the first two or three minutes will run nicely, without a miss all day long. The plugs in cylinders 1 and 4 will be clean and the cylinders themselves free from carbon but 2 and 3 become very much sooted and considerable deposit of carbon is found in those cylinders. The carbon after letting the car stand a day or so is almost as soft and wet as heavy grease. Can you give any solution why 1 and 4 should be clean and free from carbon and 2 and 3 full of it, and why is the carbon wet instead of hard as in other cases?

Is there anything in Prest-O-Lite decarbonizer which counteracts the firing of a gasoline mixture? I used the cleaner in my car, and it worked beautifully as far as getting rid of the carbon was concerned, but believe me it was two whole days, working on and off, before I could get an explosion in the cylinders. The cylinders had the appearance of being smoky or foggy, so that you could not see an object one-fourth of an inch below the surface. This mist remained in the cylinders for nearly two days, and not until it disappeared could I get the engine to start. F. H. T.

Newark, N. J.

It is just barely possible that the pipes to the sight feed are slightly clogged up so that all of the oil that flows is not indicated there. In that case, you would be feeding much more oil to your cylinders than the sight feeds indicated, and than was desirable. First thing you do, clean out these pipes, so that you may be sure that the sight feeds are honest, that is, indicating all of the oil that is flowing.

Finding that all right, there is the possibility that your carbureter is set to give too rich a mixture at slow speeds, before the auxiliary air valve opens. This would account for the formation of carbon at those times, but it is impossible to account for its being soft and wet like heavy grease as you describe it. This is something of which we have never heard before, as all carbon deposits seen or heard of have been very hard and brittle.

In finding the carbureter in proper shape as well as the oil piping, look to the fuel you use. Much of the fuel to-day is of very low grade, and some bought from unscrupulous dealers may even be doctored. This could only be done with some substance cheaper than gasoline, and the soft mass left in the cylinders might be that residue from the fuel, carried a little at a time into the cylinders, where it collected.

As to the decarbonizer, the exact chemical composition of it is unknown, but it is believed to contain kerosene in a large amount. This would not cause the trouble you speak of, nor would any known mild acid, which might be used for this purpose. It would be advisable to seek the advice of the manufacturers of this substance. They would be able to help you, and glad to do so.

Although the use of decarbonizer is strongly advocated by the makers, it does not seem to have struck the note of popular favor as yet, and your correspondence with the makers might be of interest as shedding light on the situation.

WOODS' ELECTRIC MAKES CHARACTERISTIC PROGRESS

Fig. 1—Coupé, in town service, with inside control, a wide entrance, magnificent upholstery, and driven by ladies

PIONEERS in the vineyard of electric vehicles, the Woods Motor Vehicle Company, with its large plant at Chicago, offers refinements in its 1910 cars that are in keeping with the stand this company has always taken, even when electrics were at a low eb, which, to be sure, was some years ago. The refinements, while they are positive, fall far short of revolution, being confined to such matters as will add to the radius of action of the cars and to the life of the battery. Luxuriousness, insofar as this phase of the business is concerned, reached its apex last year, and in the Woods plant, at any rate, little could be added from the style point of view, for 1910 Fig. 1 depicts a Woods, a coupe, making its daily round in one of the classes of service to which electrics are dedicated by fitness and good taste, roominess, as well as stability, are all sufficiently pictured to depreciate any further effort along this line.

Self-Contained Power Plant Presents Flexibility—It has long been known that one motor is far more efficient than two, and efficiency is the matter of greatest moment in the motor equipment of an electric vehicle, in view of the battery, which must have a wide radius of action and a long life as well, if cost of service, as well as extent thereof, is to be up to a fitting standard. To conserve the battery is to limit its output, and in order to realize a wide radius of action, it is necessary to build up the torque of the motor in keeping with the expenditure of energy, which is a matter of using a unit power plant, and it, too, must have the desired characteristics.

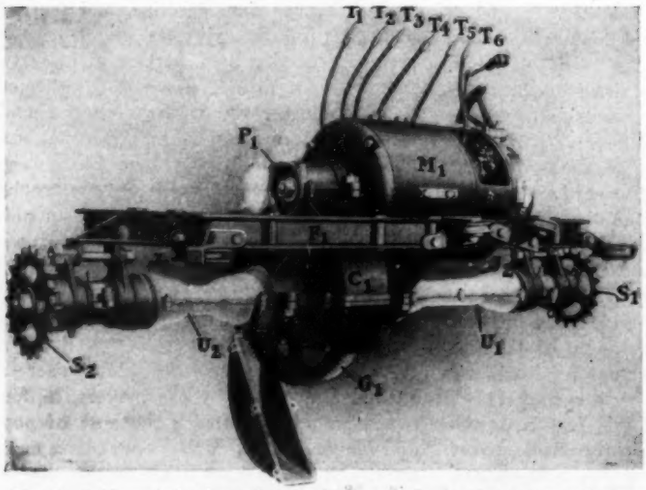


Fig. 2—Self-contained power plant, mounted on a manganese bronze frame, with tumble-shafts, universal joints, and great flexibility

It is not the maximum efficiency of the power plant that counts; the mean efficiency must be noted, and this mean efficiency will be on the highest level if the motor is so designed that the torque (twisting moment) will be in direct proportion to the current in amperes which must be taken from the battery. The torque, for current, of the motor depicted in Fig. 2 has been determined in the Woods laboratory, and it may be set down as follows:

TORQUE IN RESPONSE TO CURRENT EXPENDED

Current in Amperes	Torque in Pounds—Feet
10	2.4
20	8.8
30	16.6
40	25

From the above it will be observed that he torque of the motor is almost in direct proportion to the battery output, and the draft on the battery is limited to that which is safe. In the meantime, the speed of the motor decreases as the torque increases, about as follows:

DECREASING SPEED WITH INCREASING TORQUE

Speed in Revolutions per Minute.	Current in Amperes.	Torque in Pounds—Feet.
1,820	10	2.4
1,600	11.6	2.9
1,400	13.3	4.0
1,200	16.2	5.9
1,000	20.0	8.8
800	28.2	15.0

The above values are as nearly as possible taken from curves plotted for the purpose, with data from actual tests, in a well equipped laboratory, the actual curves to be presented in an article to be prepared on the subject of the laboratory.

From what has been shown, it is possible to predict that the efficiency of the motor is nearly constant for the entire range of performance, and that the maximum efficiency will be at the highest speed and lowest current stated. The fixed losses are very low. This is the reason why the maximum efficiency is at maximum speed, it being the case that the $I^2 R$ losses increase with the current, they being in proportion to the square of the current, and by using copper wire of relatively large section the internal resistance of the windings on both the armature and fields is held so low that increased torque is not attended by heavy losses, and the efficiency of the motor at all speeds is maintained nearly constant, as the following tabulation will indicate:

EFFICIENCY IN RELATION TO CURRENT IN AMPERES.

Efficiency in Per Cent.	Current in Amperes
82	10
84	20
81.6	30
75.9	40

When it is considered that these values for efficiency interpret all losses, it will be recognized that electrics have reached a high state, and there are good grounds for claiming that battery life is now satisfactory. Referring again to Fig. 2, M1 is the motor, transmitting power to the gear G1, through the pinion P1, which is equalized by means of a differential gearset within the case C1, and in proportion to the needs the power is transmitted through the universal shafts within the cases U1 and U2, to the sprockets S1 and S2. The frame F1 fastens to the underbody, which acts as a chassis frame, and by means of hinge joints J1 and J2 the motion of the body is compensated for so that the sprocket chains are maintained in perfect alignment.

Electrical connections are made by means of terminals T1, T2, T3, T4, T5 and T6, which lead to the windings of the motor, and by means of the wiring system provided in the body proper connect with the controller, through which to the battery, thus completing the connections for the desired purpose. This electrical wiring system is more completely presented in Fig. 3, which offers evidence of the very systematic way in which the wiring is cared for, it being the case that every part of the wiring is accessible for repair, and what is more to the point, it may be inspected at will. These provisions do not prevent adequate protection of the wiring at every point, so that depreciation, which was in former times a serious matter, is reduced to the vanishing point in these cars, due to the continual effort, which followed in the years of practice.

Design Features of Motor Portrayed—Fig. 2, while it shows the motor in combination with the means for its proper application to the work, is too complicated to properly bring out the design features that make for entire success, so that Fig 4 is here offered for the purpose of accentuating the remaining points to be touched upon. In this figure A1 is the armature, which is laminated and slotted to accommodate the windings W2, of which there are a suitable number, and the alternating waves are commuted at the commutator C1, which is made of a considerable number of "lake copper" segments, each insulated from the other and the frame by means of laminæ of Indian amber mica of the finest selection. The laminæ of the armature are of Swedish iron, rendered soft by annealing and aged to prevent hysteresis deterioration. The armature windings W2 are what are technically designated as "form wound," insulated with "sea island" cotton and taped. They are then saturated with insulating varnish and baked to expel dampness, which process seals up all the little openings and dampness cannot thereafter penetrate into the insulation.

As an additional precaution against that dread foe, dampness, the terminals are all shellacked several times.

The armature revolves on the shaft S1, in Hess-Bright ball-bearings B1 and B2, which shaft is of special steel, ground to exact size after machining, and the whole is balanced both in a kinetic, as well as a static sense, on a suitable balancing equipment after the work is done. The Hess-Bright ball-bearings, B1 and B2, fit in the bore of the housing spiders S2 and S3, which, in turn, bolt to the circular field magnet F1, in which the four poles, one of which is designated as P1, are secured, on which poles the field windings, one of which is designated as W1, are placed, after they are form wound. Current is led to the commutator C1 at four diametrically opposite points by means of brushes, which are clamped into four holders, one of which is indexed B3, they being secured to, but insulated from, the housing spider S2.

The armature windings, which are done in a winding machine, are shaped as in Fig. 5, in which A is the plan, B is looking at one diameter, and C is an end view. The number of

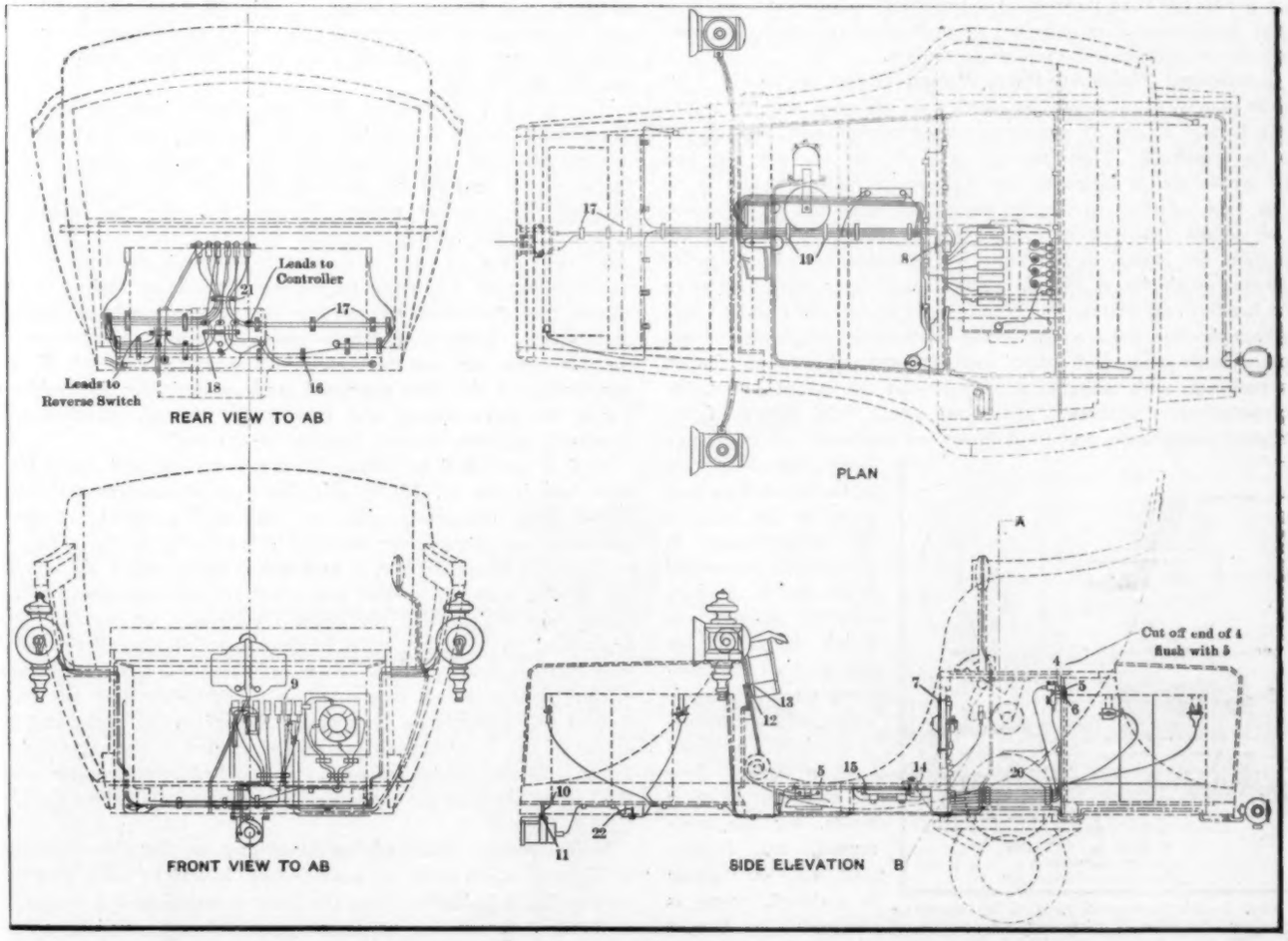


Fig. 3—Skeleton of body, showing how wiring is done, location of controller, and two halves of battery

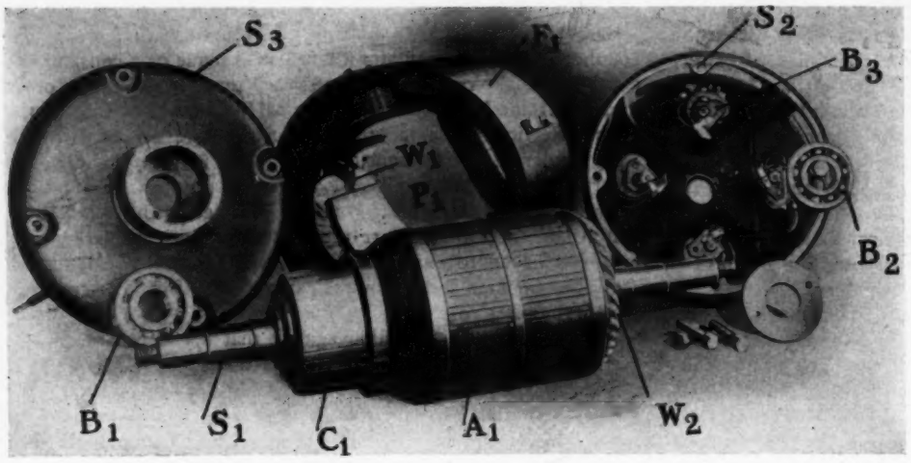


Fig. 4—Component parts of motor, presenting slotted armature, ball-bearing spindle, and form-wound laminated fields, all enclosed

turns, number of complete coils and process of insulating is stated in the figure. The armature slots are presented in Fig. 6, at A-B, on the periphery of L1, there being 33 of such slots. The transformer iron of which the discs are made is shown as respects thickness by L3, the plan of which is offered at L2. The discs are keyed onto the shaft, keyways K1, in L1, and K2, in L2 checking with K3 in P1, and K4 in P2. P1 and P2 are the end plate by means of which the discs are clamped into tight relation on the shaft or armature spindle, as it is called. The respective plates L3 are 0.017 inch thick, and to permanently insulate them, japan is put on evenly by means of a printer's roller, and they are baked in an oven. This is an extremely important process, for if paper is used instead, as it sometimes is, the heat, which is quite high when overloads are encountered, will char the paper and the insulation will then be destroyed.

Laminated Fields Are Form Wound—Referring to Fig. 7, P1 is the plan of the winding, of which four are used, and the terminals T1 and T2 are of heavily insulated flexible wire, leading out to the terminals. There are 63 turns of wire on each coil, and the whole coil is taped in the manner as indicated. P2 is an edge view of the coil and P3 shows the same coil in end view. The details involved in establishing perfect conditions of insulation are stated in the figure. The polar extensions (pole-pieces), as shown in Fig. 8, are of transformer steel, excepting the heavier end plates, which are placed as retainers and to give a backing for the rivets. These plates are 0.031 inch thick, coated with japan and baked, and with the polar horns, shaped as they are, with tangent terminations of the radius 3.0825, the computation is absolutely sparkless, which is a matter of the greatest importance, and fixed losses are confined to a minimum. Noise, due to friction of the brushes as they press on the bars of the commutator, is scarcely to be noticed at all, due to the very careful manner in which the details of this part of the construction is executed, which, unaccompanied by good design, would scarcely suffice for the purpose. Friction losses, for the same reason, are minimized, and as friction is reduced, wear is eliminated to a vast extent.

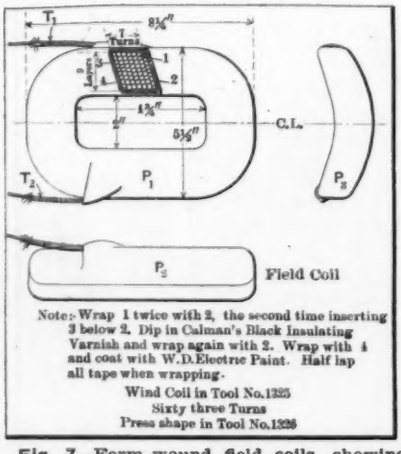


Fig. 7—Form-wound field coils, showing number of turns of wire per coil, shape of winding and method of taping to exclude dampness

How Flexibility Is Retained Without Handicap—In order to clearly depict the power plant with a view to offering the best evidence of flexibility, it will be best to present a section through the motor, universal joints, tumble shafts, etc., as offered in Fig. 9, in which M1 is the motor shell, B1 and B2 are Hess-Bright bearings on the armature spindle, P1 and P2 are the two halves of the herringbone pinion, which meshes with G1 and G2, which are the two members of the herringbone gear, which, in turn, is flanged onto the differential gear housing H1 and is held in place by holding bolts, B3, B4, etc.

The differential system is of the bevel type, with members G3 and G4 keyed to short shafts S2 and S3, and compensation is established by means of planetary pinions P3, P4, etc., which mesh with the gears G3 and G4, which pinions rotate on spindles of the spider S, which in turn rotates on the bearing B5, being threaded over the ends of the shafts S2 and S3, serving to fetch up the gears G3 and G4 on the tapers T1 and T2, keys K1 and K2 also being provided to resist all twisting moments. Hess-Bright ball-bearings B6 and B7 support the differential housing H1, and the power of the motor is duly transmitted to the tumble shafts S4 and S5, through the universal joints J1 and J2. From the tumble shafts S4 and S5 power is transmitted to the sprocket pinion shafts S6 and S7, through the universal joints J3 and J4, from whence the power passes to the sprocket pinions P5 and P6. The stub shaft S6 and S7, on which the sprocket pinions P5 and P6 are keyed by means of keys K3 and K4, runs on Hess-Bright ball-bearings B6, B7, B8 and B9.

The sprocket pinions, on their stub shafts, being in housings H2 and H3, which in turn swing free on hinge joints J5 and J6, connect with the supporting frame F1 in such a way that the distance rods D1 and D2 maintain the center to center distance between the sprocket pinions P5 and P6 with the respective sprocket wheels on the rear road wheels of the car. The distance rods have no more to do than to sustain against the torque of the motor as it is taken by the sprocket chains, and as to the chains, they run noiselessly because the spacing can be accurately maintained. True, in order to assure noiseless sprocket work, the sprockets are cut accurately, using good material in the sprockets, and the most approved machine tools for the fashioning of the teeth, taking into account the desired clearance and absolutely accurate bottom distance of the teeth.

Mud is excluded by means of the shells S8 and S9, which have ball joints J7, J8, J9 and J10 over the universal joints. These shells co-operate with the housing H4, which, in turn, passes up and sleeves over the shell of the motor at M2 For the rest, as the figure depicts, a brakedrum D3 is keyed K5 on the end of the armature spindle and a nut N1 threads onto the end of the spindle, pressing the drum D3 up to a proper fit. The brakeband B10 is faced with friction material F2 and the band is prevented from rotating when pressure is applied by means of the pin P7, which is secured in a reamed hole in the boss B11 of the spider S10. Pressure is applied to the brakeband by means of the lever L1, when a pull is applied to the cable C1 in the groove C6. Electrical energy is supplied to the motor from the battery through the controller by means of the cables C2, C3, C4, C5, C6 and C7.

Noiselessness Attained by Attending to Details—Glancing at Fig. 10, which is of the gear system, it will be plain that designing for noiselessness was the great question, and it comes as an incident that this same desire is only to be carried to a successful termination by the use of superior materials and the

closest possible limits of tolerance in the shop. The herring-bone idea is reduced to practice in this example by accurately machining two members for the gear and pinion respectively, and they in turn are cut spirally, so that when they are bolted together they eliminate "backlash" and transmit the power of the motor noiselessly.

A Hundred Details Bespeak Quality—Were it possible to present every working drawing of the cars made it would then be a simple matter to point out to what extent details in design are perfected. Rather than space every drawing, which would render this story futile, in a mass of detail, just one or two characteristic examples will be taken instead. Fig. 11, for illustration, shows how cables are secured to brakearms, and since the cables are of silico-bronze, which is permanent and strong, the equalization of the load between the two brakedrums is taken care of by means of pulley blocks. The method here shown offers strength, ease of repair, and eliminates uncertainty.

Fig. 12, of the steering control system, is sufficiently clear as not to require discussion in detail. The tubing used is cold drawn nickel steel, and the ball and socket joints are made from die forgings of special steel, machined accurately, heat treated to render the bearings glass-hard and the whole high in shock ability. Referring to the ball joint on the end of the steering arm L1, the safety member S1 prevents the ball from departing from the socket, and dirt is excluded as well.

Among the other details not shown the drum controller may be mentioned as entitled to space alone, it being of the street railway type, strong, well made, properly insulated, and lasting. This controller is selective in action, and affords absolutely no chance for the operator to make a mistake. The Woods platform springs make for easy riding, and the solid tires, made from a rubber composition by Woods' formula, work so well that road inequalities are readily negotiated. The use of Hess-Bright ball-bearings of the well-known annular type in road wheels as well as throughout the power plant is calculated by the Woods designer to eliminate nearly all friction, and tire tests, using the Woods tire dynamometer, have demonstrated many points which were taken advantage of from the tire point of view, showing that there is much to be gained by selecting tires of proper sizes, and suitable material.

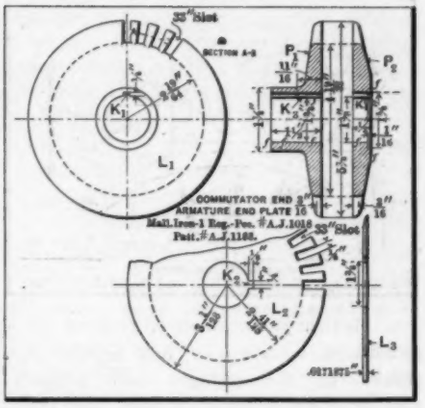


Fig. 6—Armature laminæ, showing plan of slotting, thicknesses of laminæ, method of securing, and details

ELECTRIC VEHICLE INCREASED OVER SIXTY PER CENT.

By LOUIS E. BURR, President Woods Motor Vehicle Co.

ELECTRIC vehicles to-day are an assured success, and their popularity in the larger cities is increasing very rapidly. Vehicles propelled by electric power cannot be compared at present to the gas car from a selling standpoint on account of the very significant fact that in smaller cities there are few garages that have taken the trouble to post themselves on the proper care and maintenance of the electric car. This feature in the care and maintenance is of the very greatest importance in connection with the electric vehicle. Almost any garage is equipped to take care of a gas car more or less successfully, but comparatively few are yet able to give the electric vehicle the attention and care it requires, and for this reason alone the electric car has not made the progress it should in point of sales in the smaller cities. The rather extensive campaign of education that is now being carried on by the storage battery companies and the electric vehicle manufacturers is eliminating very rapidly this feature in connection with the sale of electrics, and it is a question of a comparatively short time only when the smaller towns will recognize the very great convenience of the electric car and its cheapness of operation, and adopt its use just as vigorously as it is being adopted in the larger cities in proportion, of course, to their population.

The several cities in America, where the better class of electrics are manufactured, have larger numbers of garages well equipped to give the electric car the proper care, and for that reason electrics are very popular, as evidenced by the great num-

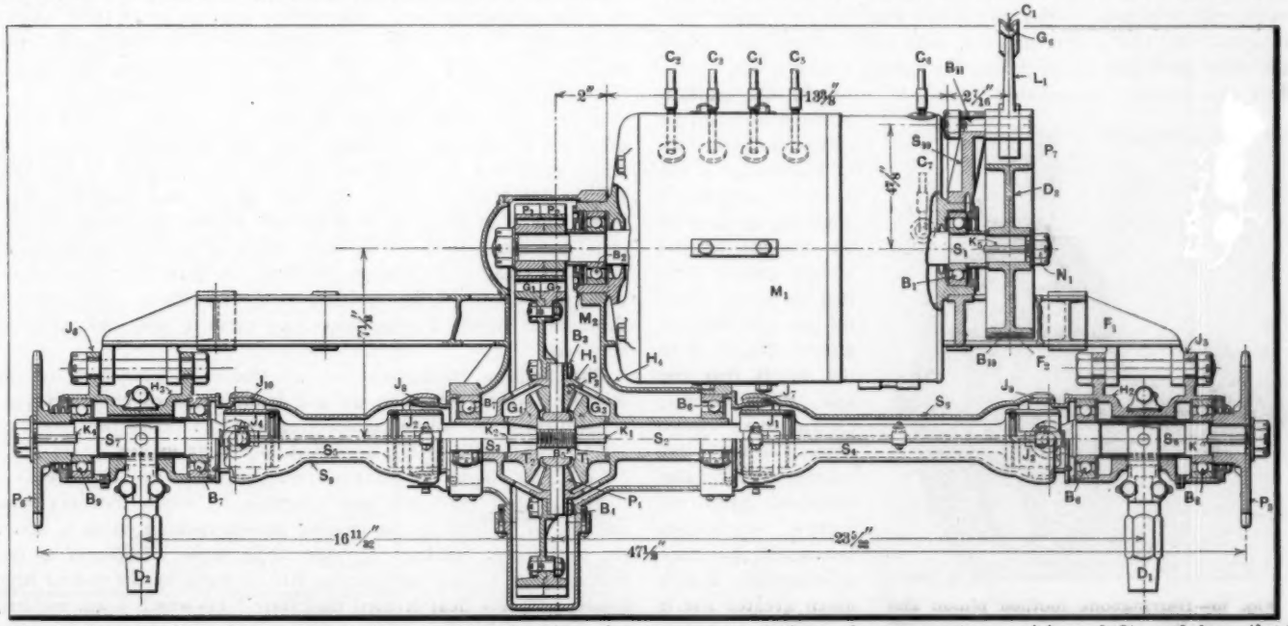


Fig. 9—Cross-section of power plant, from working drawing, showing exact relations of components, precision of fit, and how the differential gear is connected to the system

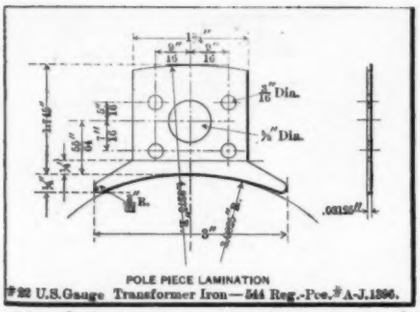


Fig. 8—Laminated pole piece, shape of horns, and method of riveting

bers that may be seen in daily use on the streets of these cities. This fact is easily explained, of course, because the manufacturers of the electric vehicles have taken pains to educate the garages in their own cities, and furthermore have established a more or less regular inspection system which checks up the garages and compels them to give the cars in their keeping at least the ordinary care they should have.

Many people believe that the electric machine is very limited in its use, and suitable only for cities with very level streets. As a matter of fact this is entirely a wrong impression, as very hilly cities like Seattle, Duluth, Kansas City, Pittsburg and Philadelphia have a large number of electric machines in daily use that give perfect satisfaction, and it is only a question of a short time when these cities above mentioned will have their full quota of electrics the same as they have in the gas car line.

To sum the matter up from a selling standpoint, which is the particular feature in this article, the electric car awaits only the education of the people all over the country. This campaign of education is being carried on by those interested in the sale of the electric machine, and it is a question of a short time only when good garages, in all cities, fully equipped to take care of the electric car will be established and the public will become aware of the many advantages accruing from the use of an electric car, not only in point of convenience, but also in the matter of cheapness of upkeep and operation.

The electric vehicle should never be compared to a gas car because it fills an entirely different position than that occupied by the gas car, and it is only claimed by the manufacturers of electrical vehicles that its use is suited to those who require a vehicle for moderate distances and moderate speed, and almost entirely for personal use and operation.

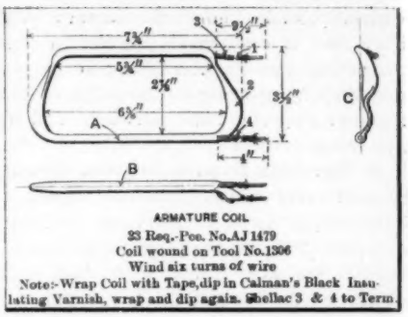

ARMATURE COIL
23 Req.-Pce. No.AJ 1479
Coil wound on Tool No.1306
Wind six turns of wire
Note:-Wrap Coil with Tape,dip in Calman's Black Insulating Varnish, wrap and dip again. Shellac 3 & 4 to Term.

Fig. 5—Plan of armature windings, which are wound in a machine, taped, then submerged in insulating compound, and baked.

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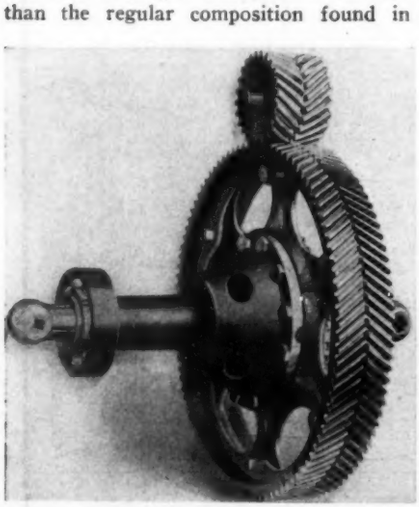

Fig. 10—Herringbone toothed pinion and gear, with the latter flanged to differential gear housing

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Solid Tires Demand the Use of Good Springs—To use solid tires it is necessary to have a good spring construction and to make everything below the vehicle springs of as light weight as possible. A good spring construction is not necessarily confined to the spring alone, but to the general "hanging" design. Good springs must have a large deflection with a slow period of vibration and ample margin of safety in regard to fiber strain after the springs have reached their full deflection. Springs of ample deflection cannot be so staisfactorily obtained in the half elliptic construction as in the full elliptic and platform type. Then, again, to get a good deflection without straining the material too much means long, thin plates of good material, properly heat treated and plenty of them. A slow period of vibration necessitates long springs, and to obtain slow periods throughout means a long wheelbase with a well balanced car between.

The limiting dimension for wheelbase is governed by the width of street, gauge of car and front width of chassis frame, consequently the following specifications are developed:

(A) Wheelbase in the neighborhood of 85 inches.

(B) Full elliptic or platform springs made of alloy steel.

The lightest rear axle and a system in which the maximum amount of weight of the gearing and propelling parts is above the springs is obtained by side chain drive. Stiffness is obtained by an I-beam section and life of axles by the use of high grade, properly heat treated materials. To which I am inclined to add the following specifications:

(C) Side chain drive; and

(D) I-beam axles in one piece, of alloy steel, heat treated.

In order to keep the power consumption as low as possible, it is necessary to maintain the axles absolutely parallel and at right angles to the direction of running. When the body surges from side to side, if regular gas car side chain drive construction is used, the rear axle moves out of parallelism; also in case chains are not equally adjusted as to center distances. It is necessary to add a specification to overcome this objectionable feature.

Electrics Are Intended for Winter's Service—Electric cars must of course, run in the Winter as well as Summer. To gain distance over snowbound streets the running in car tracks can be resorted to, so let us add:

(E) Width of gauge; gauge of standard street car track.

Motors for electric cars cannot be satisfactorily rated in horsepower, since no specific standard can be agreed upon. If the motors were rated for a continuous all-day run the publicity departments of the electric companies would be surprised at their low power and, of course, some objection would be had from this source. The discharge of the battery becomes a good safety valve, for outside of good commutation and torque characteristics the capacity of an electric should be stated in terms of time and temperature. For this reason let us write the motor specification as follows:

(F) Motor of such capacity that battery is discharged before motor is dangerously hot.

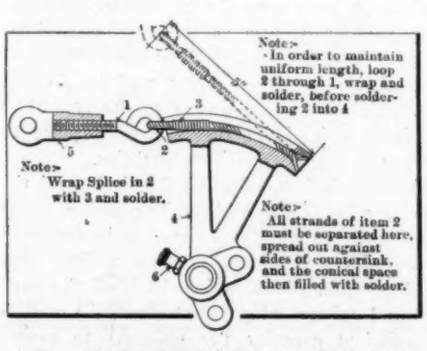
A maximum speed of slightly less than twenty miles per hour is what this car should have, with three or four speeds below this of uniform graduations. The car should be able to run fifty miles on a charge in hilly cities every day in the year, and to do this it means the battery capacity must be such as to never have to be discharged below a point where there is over 10 per cent. loss in speed from beginning to end of the discharging run.

At least two sets of good and powerful brakes are needed. The construction must be such that much oiling is not necessary, and if it is necessary to oil, place grease cups so prominently that oiling becomes self-evident. This is stated because (especially in public garages) no oiling takes place until it is necessary to use means for removing rust.

The same may be said of the steering gear. In this connection let us add to the specification side lever steering on the left side. Side lever for its simplicity, its quickness of operation, and because the speed and road conditions do not necessitate any other form. Left side because in stopping the car on the right side of a street (the correct side) it is easier to get out of the car.

Ball or Roller Bearings Must Be Used—Anti-friction bearings, the best that money can buy, should be a part of the equipment. They serve the following—reduce the power consumption, eliminate oiling, and produce reliability. The bearings must be properly housed, in order to insure long life. It is necessary to keep out dust and water and retain a large amount of oil and grease.

All working parts should be as accessible as possible, and those parts which require inspection the oftenest should be the easiest of all to get at and the most simple to cope with.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All strands of item 2 must be separated here, spread out against sides of countersink, and the conical space then filled with solder.

Fig. 11—Quadrant lever to which brake cable is fastened, offered to indicate extent to which details are worked out

About the battery a good deal can be said—what the ultimate construction and type will be is probably as hard to predict as when flying machines will run on schedule time across the Atlantic.

The lead battery of to-day is a commercial success. It will not be necessary to have a battery of imaginative newspaper descriptions to increase the electric in numbers in their chosen field. A battery slightly lighter for a given capacity is not necessary—if it is desirable to have it lighter no great change in design will take place unless the battery is reduced in weight by 75 per cent.

The matter of life now puts the electric vehicle in a high rank at present day transportation economies on account of convenience. There is a great opportunity for economies here, just as there is in any proposition, where operating cost is considered. Taking then only the battery equipment with the possible immediae improvement, we can develop the specifications as follows:

High voltage—within the range of easy insulation problems—is preferable from the standpoint of economy of transmission than low voltage. The transmission loss for a given current transmitted is represented in volts and is independent of the transmitting or impressed voltage. It is therefore evident that as the impressed voltage increases the percentage of volts lost decreases. The limiting maximum voltage is that which is regulated by the maximum voltage obtained in the majority of places. The direct current is necessary for charging and as the 110-volt supply is the most prevalent, 40 cells should be the equipment, for this is the largest number of cells which can be satisfactorily charged from such supply. If a less number of cells be used the difference in voltage must be lost in resistance so that the charging is uneconomical. Then again, if two designs necessitate the same watt capacity, the one with the lesser number of cells is at a further disadvantage, for besides the voltage loss taken care of in the resistance additional current is required on account of the distribution of the plates and the charging becomes uneconomical.

It has been suggested to charge several cars together if the voltage is 100 per cent. too much for one car, but this at the best is only a makeshift scheme and is unsatisfactory. This may not be altogether true in the case of where the supply is alternating current, but it holds true, only to a lesser degree. It is impossible to anticipate the charging supply for any given machine, so it is necessary to provide against the greatest abuses of economies.

Battery Should Be Stable Rather Than of High Capacity—Battery capacity should not be obtained by a multiplicity of thin plates because thin plates mean short life. Thick plates represent the greatest economies because in manufacturing there are certain fixed factors in costs, and as a consequence thin plates cost more for a given weight than thick ones. Obtain vehicle mileage capacity by means of substantial battery plates and make the equipment of such a nature that it can satisfactorily carry a battery of 40 cells and enough substantial plates to give the necessary results.

Body design is a matter of development. The trend now seems to be entirely to an inside operated machine, with decided effort in the direction of greater stability.

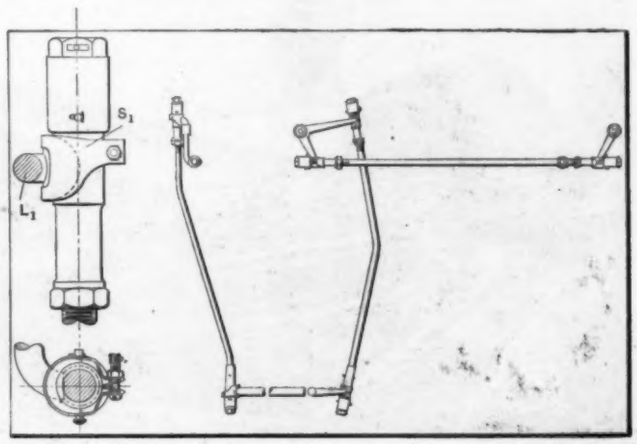

Fig. 12—Diagrammatic arrangement of control system in steering, showing arrangement of parts, nice details, and suitable design

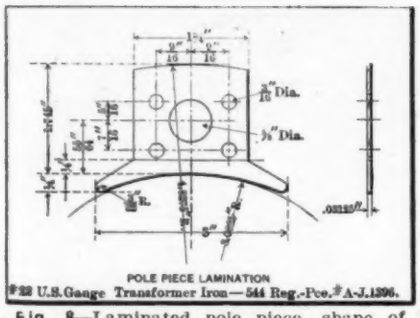

Fig. 8—Laminated pole piece, shape of horns, and method of riveting

bers that may be seen in daily use on the streets of these cities. This fact is easily explained, of course, because the manufacturers of the electric vehicles have taken pains to educate the garages in their own cities, and furthermore have established a more or less regular inspection system which checks up the garages and compels them to give the cars in their keeping at least the ordinary care they should have.

Many people believe that the electric machine is very limited in its use, and suitable only for cities with very level streets. As a matter of fact this is entirely a wrong impression, as very hilly cities like Seattle, Duluth, Kansas City, Pittsburg and Philadelphia have a large number of electric machines in daily use that give perfect satisfaction, and it is only a question of a short time when these cities above mentioned will have their full quota of electrics the same as they have in the gas car line.

To sum the matter up from a selling standpoint, which is the particular feature in this article, the electric car awaits only the education of the people all over the country. This campaign of education is being carried on by those interested in the sale of the electric machine, and it is a question of a short time only when good garages, in all cities, fully equipped to take care of the electric car will be established and the public will become aware of the many advantages accruing from the use of an electric car, not only in point of convenience, but also in the matter of cheapness of upkeep and operation.

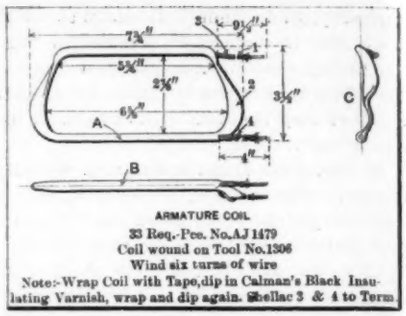
ARMATURE COIL
33 Req.-Pcs. No.AJ 1479
Coil wound on Tool No.1306
Wind six turns of wire
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Fig. 5—Plan of armature windings, which are wound in a machine, taped, then submerged in insulating compound, and baked

The electric vehicle should never be compared to a gas car because it fills an entirely different position than that occupied by the gas car, and it is only claimed by the manufacturers of electrical vehicles that its use is suited to those who require a vehicle for moderate distances and moderate speed, and almost entirely for personal use and operation.

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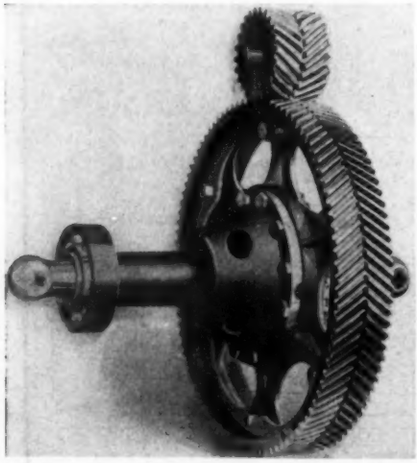

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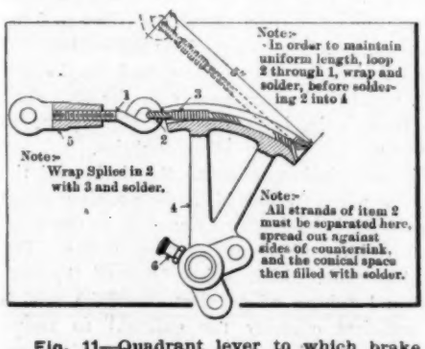
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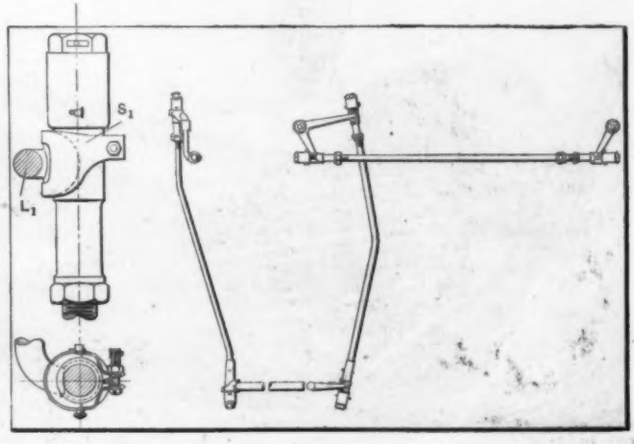


Fig. 12—Diagrammatic arrangement of control system in steering, showing arrangement of parts, nice details, and suitable design

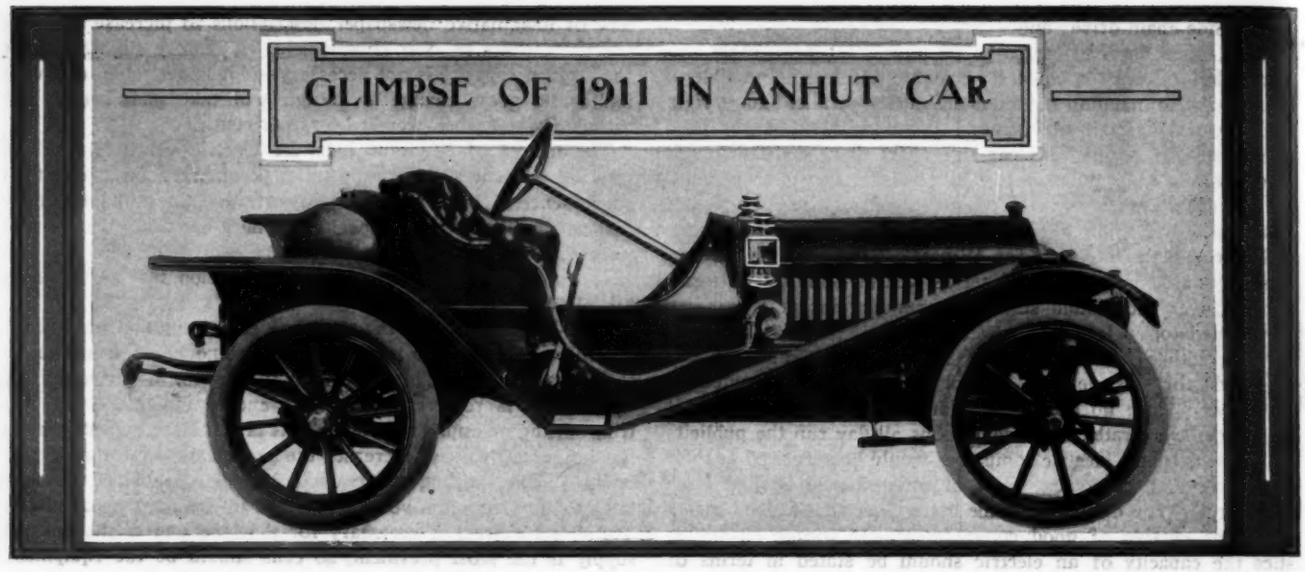


Fig. 1—Roadster, with a round gasoline tank back of seat, flaring mud-guards, 17-inch steering wheel and 110-inch wheelbase.

LOOKING backward, while it has the virtue of enabling one to note progress, affords no such pleasant occupation as "peering into the future." The Anhut maker, Anhut Motor Car Company, located at Detroit, Mich., offers, in Anhut cars, such evidences of standardization as to enable the company to claim that the car of the future is represented in the very automobile that the company is now placing at the disposal of buyers.

This car is a "six," using Brownell motor equipment, and like the motor, all the other units are standardized by time and success. In is the Anhut idea, according to the information at hand, to accept, as standard, the very designs that have faithfully performed from the start, claiming that, while the designer might like to interject his individuality, it is not wise to experiment in the face of certainty. This is not to be construed as evincing a desire, on the part of Anhut designers, to falter in the advance, but there are some things that show principle, deliver satisfaction and, in a word, of all the jewels in a crown, there is the brightest one. Sorting out the jewels requires that the eye of the expert must be utilized for what it is worth, and the principles of design that have earned the title of "standard," according to Anhut representation, will be found in Anhut cars for 1910, and force of deduction, if the first contention is true, makes it possible to proclaim that, in the Anhut, is a glimpse of 1911.

General Scheme of the Anhut Design—Briefly, the power plant, which, after all, is the most important part, is of the unit type, with the motor, clutch, and transmission gear in a single housing, and the whole is suspended on three points. The motor is of the four-cycle, water-cooled genera, with six cylinders. The power is transmitted by means of a propeller shaft, with universal joints, to a live rear axle of standard characteristics, and the wheels, on which the car rolls, are of artillery pattern, with second growth hickory spokes and felloes, of a size to take 34 x 3½-inch pneumatic tires. Semi-elliptic springs, front and rear, with thin, wide plates in sufficient presence, assure easy riding, and the channel section chassis frame is the platform on which the equipment rests. The brakes, in order that they will compare favorably with the rest of the plan, are of assured ability, they being of the external constricting and internal expanding type, engaging drums which are flanged to the rear road wheels. For the steering gear, enough is to say it is of the worm and sector type, and a 17-inch hard rubber rim steering wheel is at the disposal of the driver. For the rest, considering the car as a whole, the wheelbase, which is 110 inches, with standard tread, makes for good road work and lightness as reflected in I-section front axles, and in many other ways, is not at the expense of strength; but this same lightness, considering a 36-horsepower motor, does represent road work, under all conditions, that should be adequate for the needs of the most exacting motorist. In order, however, that the car will be more clearly portrayed, it will be necessary to illustrate the units, and to some extent, at any rate, reproduce actual working drawings, from which the car is built.

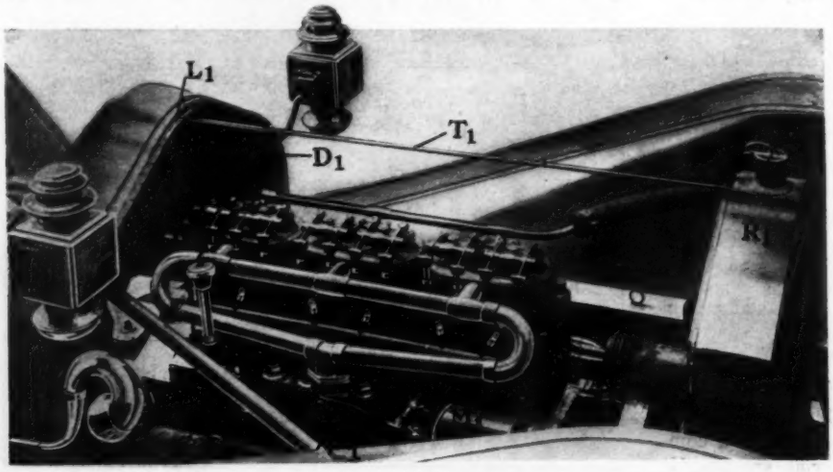


Fig. 2—Six-cylinder motor with hood off, showing carbureter, magneto and other parts

General Appearance of the Car—While the Anhut is made in two general types, the one a pony tonneau and the other a roadster, it will be, for the purpose here, enough to show the roadster, and the title illustration, Fig. 1, discloses much for favorable art criticism. The radiator, for illustration, rests over the front axle; the hood is long enough to accentuate the scheme of the designer, which is to include every evidence of a strictly roadster type of car, and the driver's seat, which is located nearer to the rear than the front axle, is in just the right place to assure the most easy riding qualities.

The seat is low, close to the deck, and the steering wheel is located in the position which was found in racing experience to be the most comfortable and of the greatest utility. The gasoline tank, which is just back of the seat, is round (shape of greatest strength) and is of sufficient capacity (20 gallons) to assure an adequate radius of travel. The springs, es-

pecially at the rear, are with but slight bow, and the rear extension of the chassis frame, which engages the spring shackles, is shapely and slender, thus possessing the utility of being limber, and of the appearance desired. Of the mud-guards, it may be stated, they are wide, of flaring set, and rigidly supported; the step, which is just in front of the front line of the seat, is stoutly ironed, and in all the little details which make so much for appearance and satisfaction the fine Italian hand of the designer is indicated by the imprint of its fingers.

What a Peep Under the Hood Discloses—In lifting the hood it will be observed that the character of the work is up to a fitting standard, and, as shown in Fig. 2, a tierod T1 holds the radiator R1 in rigid relation. The tierod being fastened to the dash D1 and a ledge L1 is beaten into form, out of the material of the dash overhang, to serve as a resting place for the hood. The filler F1, for the radiator, is hinged, and a locking bale passes over a cam-shaped rib, by means of which the cover is rendered tight, but it can be swung back at small effort when it is desired to fill the radiator, which, including the cooling system, holds four gallons of water.

Peering in at the motor and its accessories, the carbureter C1 is high enough up to be accessible, and the valve-actuating mechanism is up and above-board, where it can be inspected and worked upon. Likewise, the magneto M1 is above the level of the top of the chassis frame, which is a matter of more than a little moment in these days when accessibility is regarded as of the first importance.

What the Motor and Transmission Look Like—While looking under the hood has the virtue of affording information of a definite character on the subject of accessibility, the fact remains that in order to appreciate the points of merit residing in the power plant proper it is necessary to withdraw it from its surroundings, which is done in Fig. 3. The crankcase C1 is of aluminum, flanged F1 between the motor-case and the gear-case, and split horizontally in the crankshaft axis. The flywheel F2 is in front, and the fan F3 is driven by a round belt B1, while the fan is suspended from a round section bracket B2 and rolls on ball bearings in the fan-housing H1.

The six cylinders of the motor, C3, C4, C5, C6, C7 and C8, are cast in pairs, and in Fig. 3, which is the right side of the motor, the carbureter (a Stromberg) is connected to the intake ports by means of a manifold M1, which balances the pressure by circling around through its two branches, connecting to the three ports of the three pairs of cylinders at P1, P2 and P3 (the latter not shown). The magneto is on the right-hand side also, rests on

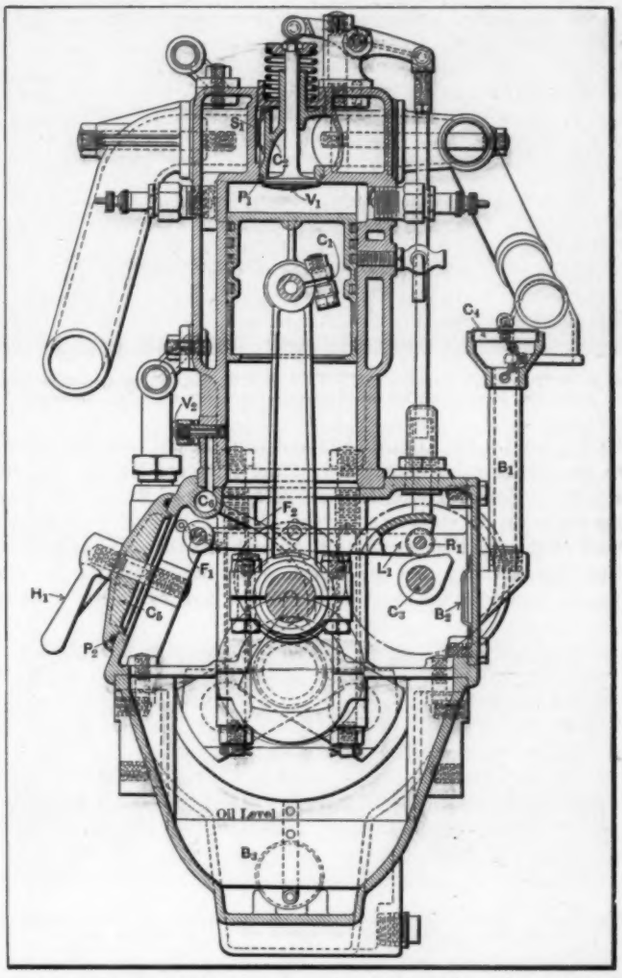


Fig. 4—Cross-section of motor, showing position of camshaft

a ledge cast integral with the uper half of the case, and is driven by a gear of the encased train, as a part of the half-time system which fixes the speed of the camshaft.

The camshaft, which is inside, is on the right side of the motor, and the tappet rods extend up from the lifts L1, L2, L3,

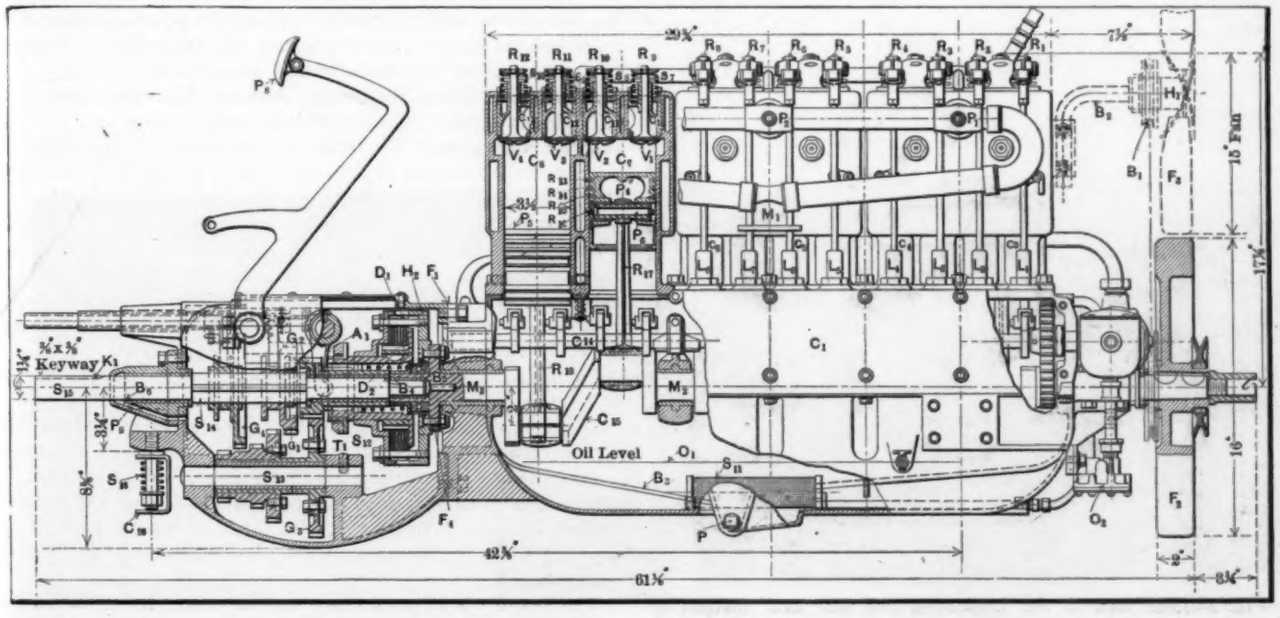


Fig. 3—Sectioned elevation of the six-cylinder Brownell motor, offering evidences of refinement and special means of lubrication

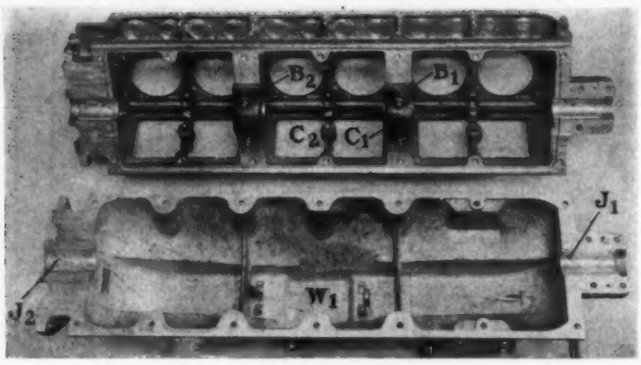


Fig. 5—Top and bottom halves of crankcase, showing caps over journals, formation of bottom half for oil-basin, and strength

L4, L5, L6, L7, L8, L9, L10, L11 and L12 (the last four not shown) to the rocker arms on the top of the cylinders R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11 and R12, R9, R10, R11 and R12 being cut away to show the section of the cylinders, presenting a view of the valve springs S7, S8, S9 and S10, the valve cages C10, C11, C12 and C13, and the valves in the heads V1, V2, V3 and V4, as shown in the section of the last two cylinders, it being

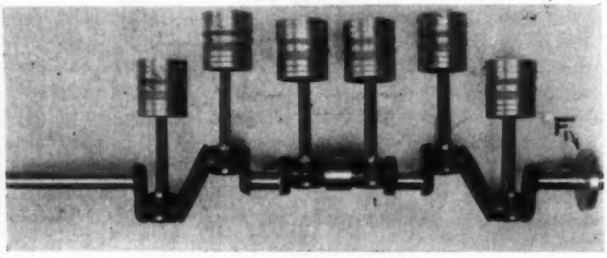


Fig. 6—Crankshaft assembly, depicting flange at rear, flywheel bearing in front, and lightness of reciprocating parts

the case, of course, that two valves (inlet and exhaust) are placed in the head of each cylinder.

The bore of cylinders is given as 3 1-2 inches and the throw of the crankpin is given as 2 inches, thus making the stroke 4 inches. The pistons P4 and P5 are like the cylinders, of cast gray iron, and light. Each piston is provided with three rings R13, R14 and R15, above the crosshead pin, to render the pistons tight against compression, and one ring R16, which passes through a slot in the crosshead pin P6, to keep the pin from floating out. The camshaft C14 is shown at the sectioned end of Fig. 3.

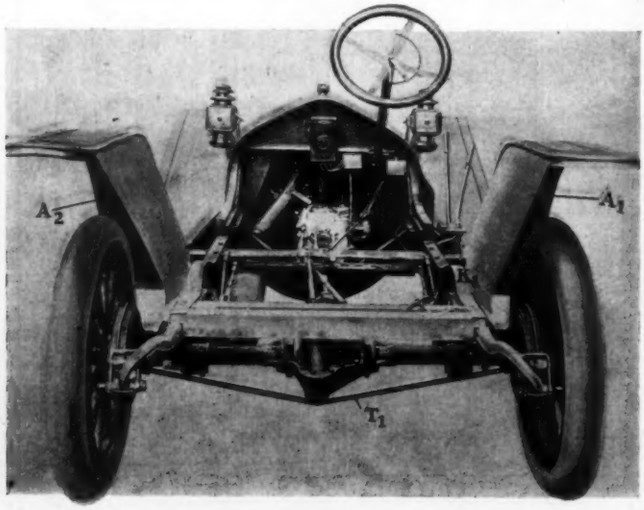


Fig. 7—Rear view of car, presenting live rear axle, method of trussing, and general accessibility with facilities for getting at bevel drive.

and the cams are integral, while the material used is cementing steel and the cam faces are glass-hard.

The connecting rods R17 and R18, as shown in the section, are drop-forged from special steel and the bearing surfaces at both ends are adequate to assure long life. The crankshaft C15 is of high carbon steel, cut from a billet of crankshaft steel, and after rough machining is hardened and ground. The main bearings M2 and M3, as shown in the section, indicate that there is a main bearing on either side of each pair of cranks, and the projected area is such as to assure good running conditions. The journals are of die-cast nickel babbitt, which is regarded in engineering circles as superior for the purpose.

The question of lubrication is of the greatest importance, and the level O1 is maintained by the oil pump O2, and all excess oil drains back to the oil basin B3, while in the process it is filtered through the strainer S11; the plug P7 is available for the purpose of draining the system out, or lowering the oil level. In view of the construction, which places the rocker arms outside, on top of the cylinders, the designer considered it necessary to carefully provide for the proper lubrication of the rocker arm bearings, and this is accomplished by making the shafts on which the arms oscillate hollow. These shafts are plugged at each end, thus forming an oil reservoir, and oil, which is fed from a spring oiler at the top of each rocker arm, maintains a profuse state of lubrication at all times. Small oil passageways are provided so that excesses of oil pass to all bearing points, which are at four places, including the pushrod bearings at the lower end of the rocker arms. Noise, which generally follows wear, is thus aborted, simply because the parts do not generate lost motion.

How the Power Plant Is Made Self-Contained—The rear end of the crankshaft, as the section (Fig. 3) depicts, is provided with a flange F4, which engages the housing H2 of the multiple disc clutch, and the discs D1, D2, etc., are alternately keyed to the driving and the driven members, respectively, so that when the spring S12 is free it presses the discs into intimate contact and the clutch is then capable of transmitting the torque of the motor to the transmission gears. To release the clutch pressure is applied to the pedal P8, actuating the arm A1, the rounded portion at the end of which engages the pocketed face of the thrust-block T1.

The selective three-speed (and reverse) transmission, as it is presented in the section (Fig. 3), shows the lay-shaft S13 below the main shaft S14, and since the drive is "direct on high gear" engagement is made by means of the internal gear G1, with the pinion of the master set G2, which master pinion meshes with the gear G3 to impart motion to the lay shaft. For the remaining speeds the sliding (sleeved) gears G1 and G4 engage their mates on the lay shaft, in response to the demands of the driver, who manipulates the side-lever for the purpose.

Mention of Some Important Details—The telescoped bearing B4 is long, and a ball thrust B5 takes care of the endwise component. The outboard bearing B6 is very liberal indeed, and the stub-end of the shaft, where it engaes the universal joint S15, is splined for a long key K1. Lubrication at this point is well cared for, and by means of the passageway P9 excesses of oil run back into the case. While the front end of the motor is suspended by arms to the side members, the rear suspension is, as shown, at a point with a spring S16, which is placed to impart flexibility. The crossbar C16 is of the channel section and liberal in view of the load.

Fig. 4 is a cross-section of the motor, and in view of specific references to the several parts, as made in Fig. 3, it is offered as showing the clamping means C1 of the upper end of the connecting rod. Flat packing P1 under the case C2 of the bevel-seated valve V1, and the virtue of this method of packing the cage will be seen at a glance, it being the case that expansion is rendered impotent thereby. A little flat spring S1 back of the case C2 prevents the same from working around and aids in assembling.

The cam C3 is of good shape and the roller R1 is forked into a supplementary lever L1, with a fulcrum at F1. This construc-

tion assures noiseless performance, since the lifts have but a thousandth or two of clearance, and this distance is below the noise point. A valve V2 controls the supply of oil to the respective cylinders, and by adjustment provided it is possible to regulate at will the supply of oil to each cylinder.

The breather B1 has a cap C4 and a baffle B2 to prevent oil from splashing up and out. The cover C5, over the hand-hole, is provided with a packing P2 and a screwed-on handle H1 to make it tight. It is quick to detach and virtue resides in the plan. The main oil channel C6 shows plainly in this section and the individual oil feed F2 is also plainly in sight. The cross-section of the oil basin B3 offers evidence of capacity, and the oiltight joint J1 is well worth more than passing notice.

Referring to Fig. 5, it will be observed that the crankshaft is suspended to the top half by bearings which are formed in the ribbing system, and the two intermediate bearings B1 and B2 are provided with caps C1 and C2. In the lower half, which is shown below, the crankshaft is carried by outboard journals J1 and J2, and this view presents further evidence of the method of oiling, with the oil well W1 formed in the bottom of this half of the case. The details of the crankshaft, connecting rods, pistons and rings, are clearly depicted in Fig. 6, and in view of the specific references in Fig. 3 it will not be necessary to more than point out that the flange F1 is placed at the rear end to transmit the torque of the motor to the clutch rather than at the flywheel, which, in a six, is relatively small and unimportant, it being the case that the increments for torque are overlapping and variations are therefore less violent.

Remaining Important Chassis Features—Fig. 7 is of the chassis looking from the rear, and the live rear axle is clearly depicted. The kick-up K1 of the side members shows, and the aprons A1 and A2 of the mud-guards offer, evidences of careful attention to details. The rear axle is trussed T1 to relieve the tube, and a cover C1 makes it easy to open up and examine the bevel drive. There are other features, of course, but they will appear at a glance, unless it is to point out that the selections of material, in the various important parts, is scarcely to be thoroughly well appreciated, since the earmarks of quality, when reference is had to material, are not as surface indications, nor to be seen through varnish. The makers, realizing that future success, which is the matter of moment, depends, to a vast extent, on quality of material, which has been given good attention.

The finished product is delivered to the purchasers either with roadster or pony tonneau body, the color scheme being deep, rich, royal blue, with light cream striping, wheels natural wood, finished with red spiking. Upholstery is in best hand-buffed leather with best hair filling and evidences of superior workmanship. The equipment includes two large headlights, two (side) square oil lamps, tail lamp, horn, jack, and a full set of tools, the whole accessory equipment being of a high grade, and especially selected to suit the car as a whole.

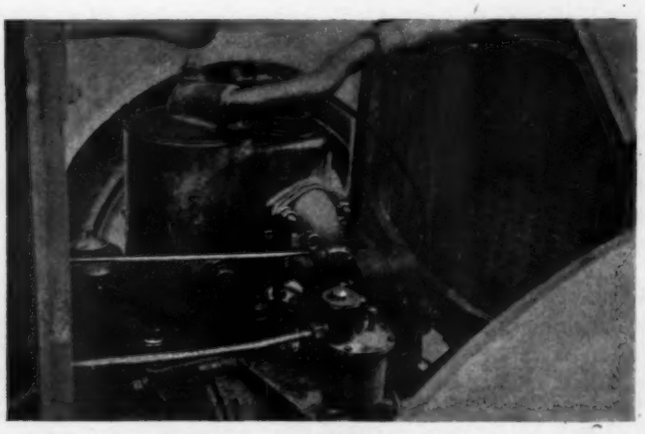
In the roadster accommodation is for two persons, but the pony tonneau has comfortable seating capacity for four persons, and the side entrance, which is provided with a door, is wide. The price of the roadster is $1,700, the pony tonneau bringing a little bit more, namely $1,800.

NEW FRENCH SMALL CAR FOR ONE PASSENGER

PARIS, Dec. 10—In a densely populated country such as France or England many a doctor, commercial traveler, road surveyor and others have objected to be obliged to use a two-passenger automobile, one seat of which was never occupied. There appeared to be a market for a one-man machine, as economical to run as a motor bicycle, but with all the comfort and road ability of a complete automobile.

A machine of this type has just been placed on the market under the name of the Zebra. Except that it has only room for one passenger and has very small dimensions, there is nothing startling in its construction. Its general design, in fact, is most conventional. A pressed-steel frame, dropped to place, the body low, carries a single-cylinder motor of five horsepower under a bonnet in the usual position. The motor has mechanical valves, thermo-syphon cooling through a tubular radiator, and relies on a high-tension magneto entirely for its indespensable spark. The gasoline and oil tanks are mounted on the dashboard, with feed, of course, by gravity with suitable means for proper control and a multiple disc clutch connects the engine to the sliding-gear set, having three speeds and reverse, and final drive is taken by a propeller shaft to rear live axle. On such a light production there is no necessity for torque rods. Brakes are on the rear-wheel drums and are enclosed, with a foot brake on the pulley at rear of the gear box. The steering column, instead of being on one side, is placed in the center, with the brake and change-speed levers in the usual position. Completely fitted with a two-seated body and hood the car weighs 660 pounds. Its speed on the level is 25 miles an hour. Although a very well-finished job mechanically, the small car has the defect of not being sufficiently fitted up in details for the class of users it is intended to serve. The man requiring a one-passenger car generally uses it from eight to ten hours a day, and in consequence calls for a considerable amount of protection not only for himself, but for the organs of the car as well. In this respect the small automobile is rather defective. It is intended to place them on the market in large numbers at $500 complete. The prospects are that the venture will meet with success, the project being in live hands, and all efforts dating from the ground up.

The Zebra, a French Car Designed for One Passenger



Operating Side of the Single-Cylinder Zebra Motor

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INDIRECT GEARING NEGLECTED

Reluctant as some may be to believe it, fashion still plays a large part in automobile design, and only too often causes the neglect of constructions which are essentially good. That type of gearbox in which the drive is indirect on the high gear affords an example. This gearbox was used on all the earlier machines, which of course were rather low in power, and gave good satisfaction.

With the increase of power which enabled cars to run for the greater part of the time on the high gear came the invention of the direct-on-high gearbox. For high-powered cars this deservedly became popular; when the high gear was in continuous use, the direct drive gave more power and less noise. But the fashionability of this design on high-powered and high-priced machines led the makers of machines of low power and low price to adopt it, merely as a talking point. To such a degree has this been carried that to-day a thorough search among the specifications of foreign and American cars reveals not a solitary adherent of the indirect system.

Surely this is not as it should be. The indirect system has advantages susceptible of mathematical proof, which are longingly recalled by veterans of the steering wheel. These advantages are most weighty on commercial vehicles and on small runabouts and touring cars, which are becoming more popular now that the craze for high power has died away. The indirect drive deserves consideration by every designer of these classes of automobiles.

In the indirect drive gearbox the power is transmitted through one pair of gears on each of the forward speeds, and through two pairs on the reverse. In the direct drive gearbox no gears are in mesh on the high gear (or whichever gear has been selected for the direct drive), but two pairs of gears are in mesh on each of the other speeds, and three on the reverse. As a certain percentage of the original power is lost in each pair of gears, it is evident that the direct-drive type has a very high efficiency on the direct-drive speed, and a rather low efficiency on the other speeds. The indirect-drive type, on the other hand, has practically the same efficiency on all speeds, the figure being between the highest and lowest of the other type.

For cars which are intended to run practically all the time on high gear, the direct drive is therefore the better; when they are momentarily compelled to use the lower gears, five per cent. more or less power means little to them. But the high-gear car is not as popular as it was. The public has learned that the automobile is a piece of mechanism, subject to the laws of mechanics, and that its changes of gearing do no more than adapt it to do its work in the most economical way.

For low-priced cars the indirect system has the great advantage of simpler and less expensive construction. A three-speed selective direct-drive gearbox usually has eight gears, counting the reverse pinions, and two dog clutches for the direct drive. The indirect box also has eight gears, but eliminates the dog clutches. The direct gearbox has three shafts, necessitating six bearings; one of these must be an "inside" or "concealed" bearing, which not unfrequently is made too small for its work. The indirect box, on the other hand, has but two shafts and four bearings, and costs much less to manufacture.

AMERICA AND THE SLOPING BONNET

Of all the foreign ideas from which we have in time past borrowed freely, one—and a very prominent one at that—has never found much favor on this side, at least not enough to warrant its adoption. By this reference is had to the sloping bonnet, or, more correctly, the dashboard location for the radiator, the shape of the bonnet being immaterial.

At present this is meeting with more favor than ever before in France, all of the highest grade cars being built in this way. In England, the idea has been adopted broadcast (with the revocation of the Renault patents), and no less than a half dozen of Britain's best cars will be so built in 1910.

In this country, on the other hand, the idea has never taken well, and to-day, with perhaps one noticeable exception of recent date, the American manufacturers stand just where they did several years ago on this subject. And yet, this design has much to commend it, the air resistance is slightly reduced, the design lends itself to simplification in the form of thermo-siphon cooling, the delicate radiator is removed from harm's way, the engine as a whole is made more accessible, and the weight distribution is perhaps improved.

With all these weighty arguments in its favor, and some others of lesser weight, why is it that the American manufacturer has not been inclined toward it, or why has the ultimate consumer, the buyer, not taken to this form? This is a question which is hard to answer, in the light of either past practice or present-day tendencies.

E-M-F AND STUDEBAKER INTERESTS ARE AT VARIANCE

DETROIT, Dec. 13—One of the bitterest legal battles the automobile industry has ever known is promised as a result of the summary action of the E-M-F Company in rescinding the selling agreement entered into with the Studebaker Company last April, and the open declaration of war by both the interested concerns. An imposing array of legal talent has been engaged by the warring factions, and official assertion is made that there will be no truce declared until the aid of the highest courts has been invoked, if such a course becomes necessary.

The trouble arose when President Walter E. Flanders, of the E-M-F Company, wrote the Studebaker Company last Thursday, notifying the South Bend concern that all contracts and agreements made and entered into whereby it was stipulated and agreed that the Studebaker Automobile Company should act as sole distributor of the products of the E-M-F Company would be treated as rescinded and annulled by the latter company. The reasons given by Mr. Flanders for this action were because, he alleged, the Studebaker Company had refused and neglected to take and pay for the number of E-M-F "30" cars ordered during the months of October and November; because of alleged failure to give any valid reason or excuse for such nonperformance of the agreement or any assurance that the expressed conditions would be lived up to in future; and because such action evinced an intention not to perform the contracts and agreements existing between the two concerns.

It was further charged that instead of establishing a fair and uniform line of discounts dealers were forced to handle the E-M-F products on discounts unfair and unprofitable; that the popularity of the E-M-F line was used by the Studebaker Company for forcing its products upon dealers if they desired to get the agency for E-M-F cars; that the Studebaker Company committed a grievous commercial blunder in announcing through the public prints that there would be no 1910 model of the E-M-F "30" car manufactured, when as a matter of fact a new model, differing in several important features from its predecessor, had been brought out; and finally that through its advertisements the Studebaker Automobile Company misled the general public into the belief that it owned a controlling interest in the E-M-F Company, it being alleged that this confused agents and buyers and injured the reputation of the product.

A fac-simile of this letter was published broadcast by the E-M-F Company, and brought officials of the Studebaker Automobile Company to Detroit on a jump, with the declaration that they had fulfilled their part of the agreement, that they regarded it as valid and in force, and that they stood ready to go into the courts and fight for what they deem their rights. Officials of the company declared that the fulfillment of the agreement would be insisted upon to the letter, and that all agents and customers would be protected regardless of cost.

As a preliminary to the war that has been declared, the Studebaker Company has retained the legal services of John S. Miller, of Chicago; Otto Kirchner and Gen. Henry M. Duffield, of this city, as special counsel. Besides these there were present at the council of war held here Scott Brown, general counsel of the Studebaker Company; Frederick S. Fish, chairman of the executive committee; Clement Studebaker, treasurer, and Hayden Eames, general manager of the company.

"The Studebaker Company has observed and has not broken its contract with the E-M-F Company," said Attorney Miller, at the close of the conference, speaking officially. "It has established throughout the country selling agencies to the number of several hundreds for the handling of the E-M-F car. It has expended in exploitation of the car and in agencies and facilities several hundred thousand dollars. It has also made sales of the car to be delivered to the extent of hundreds of thousands of dollars. The Studebaker Company has never failed to pay for cars and the E-M-F Company owes a large amount of money under the contract. The claim that the Studebaker Company has failed to take cars required by the contract is untrue. The E-M-F Company has not yet manufactured or had ready for delivery the number of cars it claims the Studebaker is in default of taking. The Studebaker Company has taken all the cars it is obligated to take, and stands ready to take and pay for all such cars in the future."

Officials of the E-M-F Company, just as positive in their assertions that the terms of the agreement have not been carried out, and insist that they will proceed to handle all sales direct hereafter.

Trouble has been brewing for some time, in fact almost from the day the selling arrangement was effected by the two concerns. Of late, however, the situation has become more acute, finally leading to the open rupture caused by Mr. Flanders' drastic action.

The union of the two companies last April was one of the most sensational deals in the history of the automobile industry. For the purpose of securing the E-M-F line of cars to add to other models made by them, officials of the Studebaker Company purchased the stock of William E. Metzger and B. F. Everitt in the E-M-F Company, paying a premium of something like 200 per cent. The capital stock of the company was increased from $500,000 to $1,000,000, and in the reorganization three directors were elected from the Studebaker Company. However, the individuality of the E-M-F Company was retained, and a majority of the stock remained in old hands, a contract being made with the Studebaker Company merely to market the cars. All contracts with E-M-F agents were cancelled at their expiration, September 1, last, and the entire output was to have been taken by the Studebaker Company. Because of the number of lines handled by the selling concern, as well as for other reasons, the arrangement became unsatisfactory, and the E-M-F Company decided to sever all existing relations and market its own product.

The contract with the Studebaker Company is said to have called for 29,600 of the "30" and "20" models for the year beginning September 1, 1909. It is asserted by E-M-F officials that this number will be greatly exceeded with the increased facilities being installed.

Just what the first step in the legal battle threatened will be is not disclosed. Counsel for the Studebaker Company declines to state what action will be taken, merely asserting that the company proposes to insist upon the fulfillment of the selling agreements, and that it will in every instance protect the interests of agents and customers. Meanwhile, the E-M-F Company, having made the first move, is awaiting developments.

What the District Court Has Ruled

DETROIT, Dec. 14—District Court Judge Swan, Monday evening, refused to issue peremptory restraining order asked by Studebaker Automobile Company in its suit against the E-M-F Company to prevent latter annulling the three-year selling agreement between the two companies. The Studebaker Company was given until Wednesday to serve copy of application on the E-M-F, and the latter until Saturday to serve answer. The matter has been set for a hearing next Monday. The Studebaker application stated it had agreed to pay $900 each for E-M-F cars, giving it gross profit of $350; that from April 29 to August 31 it received 4,500 cars, or 1,700 less than it had orders for; for the first year, beginning August 31 last, it was to take 15,200 "30's", and it already has orders for 8,000, exclusive of Flanders "20's". The Studebaker Company claims it has acquired property right which cannot be usurped. The action of the E-M-F directors disrupts business.

S. A. E. WILL HOLD DUAL MEETING THIS WINTER

JUST as in former years, the Society of Automobile Engineers will hold a dual meeting, that is to say, it will meet on Tuesday, January 4, at the Automobile Club of America, at ten o'clock in the morning and hold an all-day session which will include the election of officers for the ensuing year. Papers will be read, discussions will be indulged in, and a dinner will be given at the club, at eight o'clock in the evening.

When the meeting adjourns, it will be until January 13, to meet at the Engineers Club, the idea being to afford its members who cannot attend the meeting which will be held during the A. M. C. M. A. show (the January 4 meeting), a chance to be present at the adjourned meeting which will occur while the A. L. A. M. is holding its show. The adjourned meeting will be quite as interesting, will open at ten o'clock in the morning at the Engineers' Club, papers will be read and discussed, and in the evening a dinner will be given just as at the first meeting, the only exception being that the second dinner will be held at the Engineers' Club.

The meeting this year should prove of the greatest value to the members and the industry as a whole, it being the avowed purpose of the society to deal in the abstract; avoid trade affiliations and serve the whole industry for a broad purpose. The papers in hand are of a high character, the society membership is large and growing, holding in its makeup every chief engineer from almost every company of importance in this country.

In addition to this large contingent of the foremost American automobile engineers, there is a growing representation from abroad, in what is known as International Members, which is a membership contrived by the society to enable foreign automobile engineers to come across with papers; receive the papers of the society and discuss the subjects at length for the common good. These exchanges of ideas, as interpreted by engineers, will, in the long run, build up the automobile, as a machine, to a state of perfection which is not to be done in any other way. It is of the greatest value to engineers and the industry as a whole, to meet, discuss knotty problems and evolve the right answer. The time must come when the automobile as a machine must be standardized, and who is better qualified than a body of the very engineers who are now responsible for the splendid machines which now afford pleasure and profit to a vast concourse.

GRAND PRIX CALLED OFF—NOT ENOUGH ENTRIES

PARIS, Dec. 9—There will be another year without racing in Europe, owing to the French Grand Prix having failed to fill. When the entry list was closed, the Racing Board of the Automobile Club of France was in possession of twelve cars instead of the forty-five it had fixed as a minimum for the holding of a pure speed test next year. The firms that had decided to show their speed ability under the no-limitation rule were Benz, De Dion Bouton, Rolland-Pilain and Hispano Suiza. One of these firms, the De Dion Bouton Company, had only entered because of the personal conviction of the Marquis de Dion that it was a mistake on the part of the French manufacturers to allow the automobile industry to become nothing more than an industry, as it is tending to become through the absence of racing and shows. Three or four firms failed to send in their entry fees because of the conviction that the necessary forty-five cars could not be obtained.

There appears to have been a belief among the members of the Racing Board that the necessary forty-five cars could be obtained, for before the race was definitely announced personal inquiries were made in all the factories and the promise of forty-two cars was made. Thus it only needed a few foreign entries to obtain what the club considered a necessary minimum. After promising, however, the big firms banded themselves together against any race and the enthusiasm of the smaller constructors quickly fizzled out. Belgium has come forward with the promise of two races on the famous Ardennes course, one of them to be for limited bore and the other for unlimited cars, but in view of the French refusal to take part in any speed event it is very doubtful if she can carry it through on her national resources.

The abandonment of the Grand Prix doubtless carries with it the death of the proposed aeroplane race from Dieppe to the English coast and return, which was to be one of the items of a week's sport in Normandy. The club was only disposed to undertake this if its automobile road race became a reality. This having been killed, it looks upon an aeroplane race alone as rather outside the field of its activities. The only hope of it being held now lies in the towns of Dieppe and Brighton taking it up. As the event would attract spectators in thousands from all parts of the world, there is a possibility of the townships undertaking the cross-Channel flight programme.

Since the abandonment of the Grand Prix the committee of the Automobile Club has agreed in principle to organize next year an aeroplane race from Paris to Brussels, either in a single journey or in stages. The distance by road is practically 200 miles; thus it would be possible, with a light following wind, to make the flight without a stop. Brussels has been selected as the finishing point of the flight by reason of an exhibition which will be held there next year. A better choice might have been made, for the northeast of France is a manufacturing district having very few attractions for the automobilist, while the roads, especially in Belgium and on the French frontier, are far from being the best in Europe.

EX-CHAIRMAN HOWER GETS TESTIMONIAL

BUFFALO, N. Y., Dec. 11—At the Automobile Club of Buffalo last Monday evening Frank B. Hower, former chairman of the Contest Board of the A. A. A., received a chest of silver from the directors of the national organization. It was intended to present the gift to Mr. Hower at the A. A. A. annual meeting in New York, but the plan fell through owing to the absence in the West of the intended recipient.

Chairman George C. Diehl of the Good Roads Board made the presentation speech. Mr. Hower was the most surprised man among the 350 members of the club who were present. His speech, thanking Chairman Diehl as the representative of the A. A. A. was brief, but his manner expressed plainly his pleasure.

KENTUCKY TO CELEBRATE GOOD ROADS LAW

LOUISVILLE, KY., Dec. 13—Arrangements have been completed for a monster banquet in celebration of the recent victory of the Bosworth-Wyatt amendment to the constitution providing for good roads in the State of Kentucky. Prominent Kentuckians from throughout the State will assemble around the festal board on the evening of December 15 at the Seelbach hotel. Final details for the banquet are being worked out by Julius V. Beckmann, secretary of the Kentucky Good Roads Association; Dr. Ben L. Bruner, Secretary of State, and Sam P. Jones, president of the Commercial Bank and Trust Company. Specially invited guests will number about seventy-five. Among the speakers will be Governor Augustus Willson.

WORK STARTED ON ELABORATE PALACE SHOW EFFECTS

THIS week operations were begun on the interior decorations of the Grand Central Palace, New York City, for the Tenth International Automobile Show which opens on New Year's eve, under the management of the American Motor Car Manufacturers' Association. Unitt & Wickes, the official decorators, started a force of 125 artisans at work on the trellis

Decorative Plan of Main Hall, Grand Central Palace

garden decorative effect which will be used for the first time in a New York automobile show.

While past automobile shows in New York have been elaborate in decorative effects and have given the gorgeous machines and polished chassis an excellent setting, the trellis garden decorative scheme will linger long in the minds of the public for its simplicity, while it will be impressive and totally different from any preceding show.

Heretofore it has not been possible for the decorators to get into the Palace so far in advance of the show, but this year all work will be completed before the private view at three o'clock, on Friday, December 31.

The work of transfiguring the first gallery has already been begun and as soon as this is completed, the artists and carpenters will start work on the second gallery and will then give their attention to the main exhibition hall. Special attention will be given this year to the ceilings under the two balconies, which, heretofore, have not been given much attention by the decorators, but Unitt and Wickes have conceived an excellent decorative effect which will completely hide from view the previously barren ceilings.

One of the most spectacular features of the decorative scheme will be a huge electrical marble fountain stationed at the end of the main hall where last year's statue of Age Instructing Youth was erected. The base of this fountain will measure 16 feet, and it will be over 14 feet in height. Back of the fountain will be an immense plate glass mirror, and surrounding the two will be a beautiful peristyle of green trelliswork, 40 feet in length by 25 feet in width. At the base of the fountain and surrounding the peristyle will be planted low-growing trees, shrubbery and potted plants. The fountain itself, which involves some cunning mechanical ideas, will be operated by a rotary pump and the electrical effects will be produced by a combination of colored mirrors and electricity, which it is expected, will excel anything of its kind ever seen in this country.

Another striking effect which will greet the visitors, even before they enter the building, will be a beautiful porte cochere of green trellis work and frosted glass, which will be illuminated at night by hundreds of parti-colored electric lights, and the whole surmounted by a reproduction of "Miss Liberty at the Wheel" which is also outlined in electric lights.

One of the decorative schemes which will add unusual attractiveness to the Palace will be 100 paintings, measuring 30 by 15 feet in dimensions. These paintings harmonize with the regular trellis scheme and depict various garden and country scenes. Each will be surrounded with lattice work so as to give one the impression of gazing upon midsummer scenes, which will be a marked contrast to the climatic conditions outside of the Palace. The paintings are now being placed in position and will extend around the entire inside of the main floor and the two balconies.

Briefly, the color scheme and decorative effect for this year's show will be nile green lattice work on a soft caen stone background, while the roof will simulate a large trellis arbor hung with grape vines, through which the blue sky is faintly seen. The whole is softly illuminated by scores of immense electric lights, which are hung by chains from the roof of the arbor.

One of the 100 Paintings with Trellis Effect Used

The signs, too, have been specially designed and the names of the various exhibitors will appear in raised gilt Egyptian letters on a green ground surrounded by the usual lattice framework. This idea will be followed all through the main floor and the two upper galleries, except in the central court on the main exhibition floor where trellis standards surmounted by illuminated alabaster signs, will be employed.

DAZZLING DISPLAY OF TROPHIES AT GARDEN SHOW

RACING trophies, great and minor, naturally increase in number each year, but 1909 has been an unusually active one in automobile contests and the aggregate of cups and things now in the hands of motor car manufacturers and agents is enough to make a solid silver monument of heroic size to the Hon. Wm. J. Bryan, or some other man deserving such a fate.

A fine display of these automobile trophies will be made collectively at Madison Square Garden during the week of the Tenth National Automobile Show, January 8-15, and the public then will have the first good opportunity to see the prizes of which it has heard a great deal, assembled all under one roof and in a group and displayed with an amply attractive setting.

The show committee has arranged to make this display of cups, placques, medallions, etc., a feature and a special department of the show. A big case will be provided for the trophies and they will all be ticketed and a pamphlet furnished telling the details of each trophy, its cost, history, etc., and by whom it was won. Big and little, there will be scores of prizes in this loan collection.

Prominent will be the classic Vanderbilt Cup that was won by Harry F. Grant in the Alco; this will be loaned by the American Locomotive Company. The Glidden and Hower trophies, both awarded to the Pierce-Arrow Motor Car Company, are objects of perennial interest, also, and these will figure conspicuously.

Lozier Motor Company will contribute the handsome trophies won in 24-hour races by their six-cylinder car and the splendid statuette won in the Long Island Motor Hunt. The Indiana trophy, the Massapequa Cup, the Merrimac Valley prize, and the Detroit trophy, won in the Glidden tour, will be among the many exhibits made by the Chalmers-Detroit Motor Company. Dewar Cup, awarded by the Royal Automobile Club, of London, in its standardization test, will be loaned by the Cadillac Motor Car Company. The Knox Automobile Company and several others, also, have declared their intention to participate and it is quite possible that some of the recently admitted members of the Association of Licensed Automobile Manufacturers, who will not have any cars on exhibition, will be represented at the show in this display of trophies.

PREPARING FOR THE SALT CITY'S BIG SHOW

SYRACUSE, N. Y., Dec. 11—The next automobile show under the direction of the Automobile Dealers Association of Syracuse, it was announced this week, will be held in the State Armory from March 14 to 19, inclusive. The dates follow immediately upon the heels of the Boston show, which the Syracuse dealers consider a most opportune time.

The directors of the Dealers Association have been holding meetings at the Hotel Yates this week and starting active preparations for the exhibition, which they claim is going to eclipse anything outside of the New York shows. It is to last two days longer than that of last year and much money will be spent in decorations and illumination in an effort to make the big Armory as beautiful as possible. Those at the conferences included President C. Arthur Benjamin, Vice-President H. D. Van Brunt, Secretary M. W. Kerr and C. H. Norris.

From a complete directory of dealers in Syracuse, prepared at the office of the Automobile Club of Syracuse, it is shown that there are no less than 35 makes of cars sold by eighteen dealers. Since last December the number of dealers in this city, and the number of makes of cars represented, have almost doubled. This is representative of the prosperity, which is everywhere evident in the Salt City, not alone among the dealers and repair men, but at all of the factories as well, most of the latter being now at work nights as well as during the entire day.

SIMMS VIEWS SITUATION WITH OPTIMISM

NEW YORK CITY, Dec. 11—When interviewed by a representative of THE AUTOMOBILE here to-day, Frederick R. Simms, of London, Eng., expressed himself very optimistically on the present situation, both as to automobiles, and what is more close to him, as to magnetos. Mr. Simms was in the city for about a week in connection with the new branch office which he has just established on Broadway to supply the American trade with Simms' magnetos.

For the present, the business will be confined to the exportation of assembled magnetos, followed very shortly by the shipping of parts, which will be assembled on this side (the duty on parts being less than on whole machines). Ultimately, however, the intention is to establish an American factory not far from New York City, where the magnetos will be manufactured complete from the present specifications.

Just at this time, the English and Continental demand for the product is such that the works at Kilburn in London, turning out 600 magnetos per week, is unable to supply the demand. To relieve the situation there, a factory addition is now under way, which will be occupied by March 1. This addition will raise the output to 1,100 machines per week.

On the subject of the present prosperity, Mr. Simms expressed some interesting ideas. He thinks that the present American situation will be continued without change for about two years, or three at the outside, when factory outputs here will have increased to such an extent that overproduction will have taken place, and that the automobile industry in this country then will pass through a crisis, the extent and seriousness of it depending wholly upon the extent of overproduction.

Relative to the other side, and speaking on the same subject, he voiced the opinion that in England, France, Italy and Belgium automobile firms have passed through their critical period and are now on the recovery. England, in particular, coming into her own this year, in connection with the very successful Olympia show which has just closed. Germany, he says, is just emerging from her critical period.

Aeronautics have experienced a great boom on the other side, far greater than can be realized over here, where so little has been done. He said advisedly that the majority of automobile and engine builders in England and France are doing something in this line, either a complete machine or a light engine. The latter have brought a demand for an especially light magneto, and his company is making one, in which the weight is reduced by half or more. His prediction is that in five years aerial machines will be more common that automobiles are now, and that in the meantime, the Atlantic will have been crossed. On the subject of crossing the water, the machine to accomplish this would be a combination of dirigible and aeroplane.

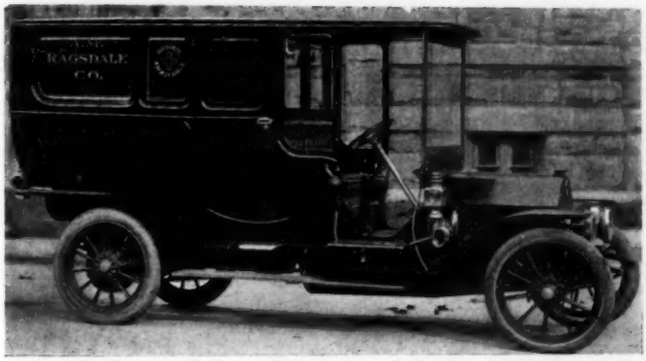
One interesting point which he made was that double ignition, or, as it is often called, dual ignition, is losing ground very rapidly on the other side, the magneto being relied upon for all purposes, even to starting.

ALDEN SAMPSON MANUFACTURING COMPANY WILL CONTINUE

WHEN on December 5, at Pittsfield, Mass., Alden Sampson was laid to rest, the automobile world lost an ideal pioneer, one of its most accomplished engineers and a pillar of stability, of which there were but a few to conjure by.

It will come as no surprise to those who enjoyed the confidence of the late head of this pioneer company that it is to go on; the expressed wish of the late Alden Sampson was that not a moment should be lost; not a thing should be changed; not a single effort should be made which would even tend to dim the luster that clings to a name connected with pioneer effort, original investigation and ceaseless effort in quest of quality—that quality which has the patience to await commercial success as a just reward of its efforts.

Of the trucks made in the past, none was allowed to go into any service for which it was not well fitted, and this year's trucks, of which the company has a goodly number in process, will be placed with the same discriminating care for the future welfare of the company. G. E. Mitchell, long associated with the company, is at the helm, and THE AUTOMOBILE, in expressing its deep regret at the sad event, is compensated in some measure by a situation which assures that the efforts of Alden Sampson will not be lost to posterity.



Specially Fitted Ambulance Built by the Premier Company

NEW AMBULANCE ON PREMIER CHASSIS

Appearing at first glance like a rather long limousine, the motor ambulance just finished by the Premier Motor Manufacturing Company, of Indianapolis, Ind., for an undertaking firm of that city, the A. M. Ragdale Company, has a number of excellent points. It was completed very recently, and put into service for the first time in connection with the Speedway races. The chassis is the same as those used on the regular Premier four-cylinder cars, with a motor rated at 36.1 horsepower.

In the construction of the ambulance, speed, ease in riding and a wish to avoid the morbid curiosity of pedestrians were incorporated in the design. A double floor practically eliminates all sound from the machinery. There is an entrance on each side of the car back of the driver's seat and half of the back of the car opens, forming an entrance for the stretcher, which is of folding canvas design. The canvas is mounted on a folding steel frame, which folds and locks to hold it in place. The stretcher is operated over a roller concealed under the cushions of the rear seat, and fits into steel grooves fastened to the front and rear of the interior of the body. The sides, back and front of the interior are upholstered in black leather. There are two folding chairs, one of which is moved to make room for the stretcher, while the other forms a seat for the physician. Half of the rear seat is also available when the stretcher is in use. The double floor in the car also serves for storing the stretcher when not in use, or for storing the extra chair not used when the stretcher is in place.

Dark green is the body finish, needle-striped with red. Each window is fitted with curtains which bear the company's name. When the ambulance is approaching the patient's home or hospital, however, these curtains are raised, thus removing all appearances of an ambulance and assuming that of an elegantly appointed pleasure car.

UNITED MFRS. WILL SUPPLY TRADEMARKS

NEW YORK, Dec. 13—Believing that the could materially assist motoring public, dealer and themselves, five of the oldest and best known accessory builders organized some months since a selling and distributing company to be known as the United Manufacturers. The various units comprising this organization are the Jones Speedometer, C. A. Mezger, Inc., Weed Chain Tire Grip Company, Connecticut Telephone & Electric Company and the N. Y. & N. J. Lubricant Company. The principal object of the formation of this selling organization, is primarily to reduce the cost of these accessories to the consumer; to protect the reliable dealer, seeing that he gets a profit that will enable him to give the consumer the best possible service; and protect themselves and the public against shoddy substituting and infringing. The management of the United Manufacturers states that it believes that all fair-minded dealers are opposed to substitution of any standard product by unscrupulous manufacturers, and therefore, the efforts of the United Manufacturers to stamp out this insidious competition will meet with the hearty approval of their customers among the automobilists.

The United Manufacturers announce that they will supply every reliable dealer in the country with a trademark sign of their own. This is rather a novel idea, and will act as a guarantee to all motorists who are seeking their standard products. Of course that economy is made possible through co-operation is obvious. It naturally decreases the cost of production and selling. The savings made possible by this co-operation really go to the benefit of the consumer, and for that reason, the advent of the United Manufacturers in the accessory field is certain to receive the support of dealer and consumer.

WARNER TAKES UP AERO ACCESSORIES

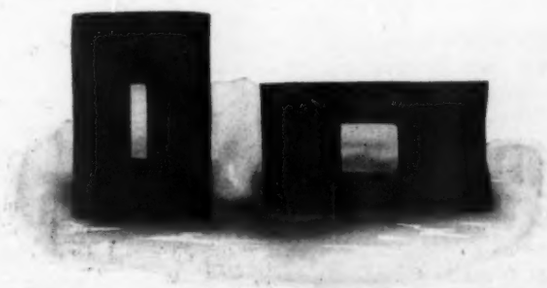
The anemometer, an instrument for showing the velocity of the wind, renders aviators almost invaluable assistance. When stationary, on the ground, it indicates any movement of the surrounding air; when mounted on an aeroplane, it indicates the rate of movement through the air. Although sometimes made in a windmill form, the most common type of anemometer is that with cups mounted on radial arms. The concave surfaces of the cups give the wind a good grip, while the convex surfaces of the cups returning against the wind offer the minimum resistance. In combination wtih the revolving parts some form of speed indicator is used to measure the velocity in miles per hour. This must be suitably calibrated, of course, as on account of friction and other resistances the movement of the cups is slower than the movement of the air.

The Warner Instrument Company, of Beloit, Wis., has found that its magnetic speedometer, as used on automobiles, may be advantageously adapted to anemometer service, and accordingly has brought out a complete anemometer with indicator attached. This instrument is now being sold on a commercial scale. The anemometer measures 17 1-2 inches across opposite cups and weighs, complete, two pounds. The scale is calibrated to read from 0 to 60 miles an hour, which is a sufficient range for ordinary service. One of the anemometers has been in use for some time on the Curtiss aeroplane purchased last summer by A. P. Warner, the vice-president of the company.

VANADIUM STEEL DIES FOR FORGING

A customer of the Pennsylvania Forge Company, of Philadelphia, was using carbon steel dies for very severe service in hot forging and drawing work. These dies were giving an average service of two days, breaking from crystallization or defects in the steel brought out by the constant and heavy blows. It was finally decided to try vanadium steel, in the hope that the remarkable properties of vanadium in retarding crystallization would give the dies a longer period of usefulness.

Some vanadium steel was obtained from the Bethlehem Steel Company and the dies shown in the illustration were made therefrom. The Pennsylvania Forge Company vouches for the fact that the dies were used in the same manner, by the same man and for the same service as the carbon dies. At present they have been in use for over four months, and the illustration shows their condition. The American Vanadium Company, of Pittsburg, gives the analysis of the metal as .75 carbon, .90 chromium and .25 vanadium (contained).



Vanadium Steel Dies That Have Been Used Four Months

Recent Purchasers of Studebaker E-M-F "30's," of Dayton and Springfield, Ohio, Who Have Formed a Studebaker Club

QUAKER CITY TRADE HAD A FINE YEAR

PHILADELPHIA, Dec. 13—Enthusiastic to a degree was the annual meeting of the Philadelphia Automobile Trade Association last Tuesday at its Odd Fellows' Temple quarters. With a sizable balance in the treasury, with fifty-three concerns on the books, and with the success of next month's show already assured, the optimistic spirit that prevailed was not to be wondered at. The past year was the most successful ever experienced by the local automobile trade. A careful estimate indicated a one-third increase over last year, with more than 3,000 cars disposed of for local use alone, not to mentioon upward of 1,200 more distributed to agents in this territory through the various factory branches located here.

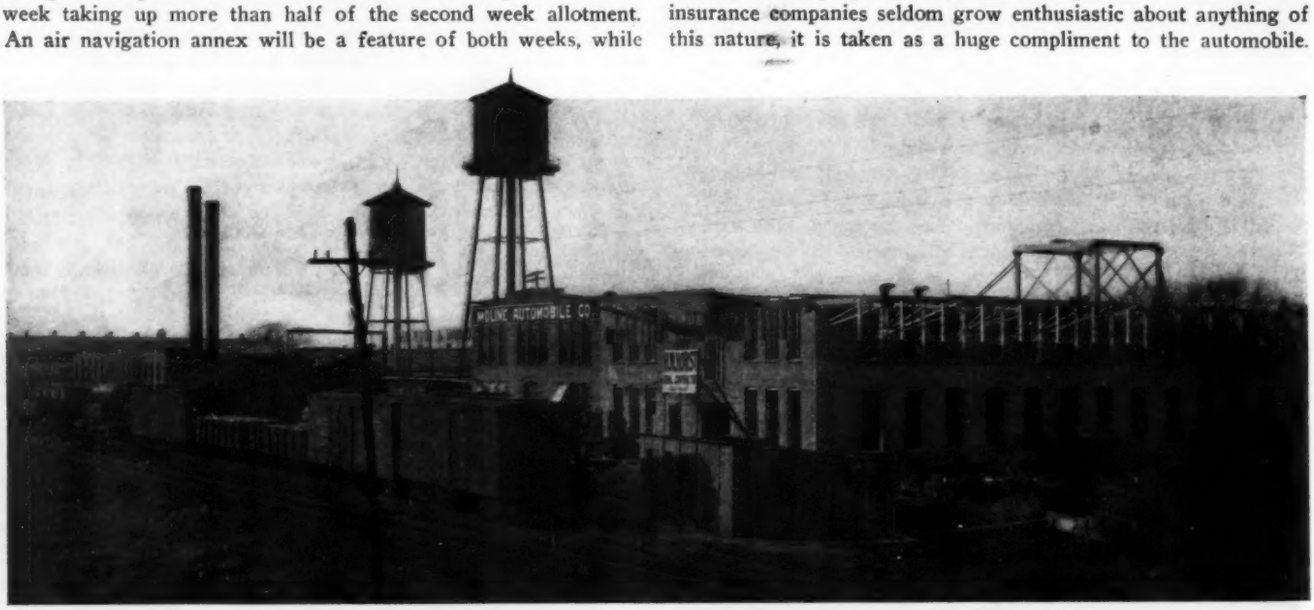
The report of Secretary Beck showed fifty-six concerns engaged in the selling of automobiles, of which fifteen were branch houses and forty-one agencies. Twenty-one of these concerns remain unrepresented in the association. The report also showed twenty-eight accessories jobbers and retailers, twenty-one tire houses and seventy-two garages. All of the members present reported the outlook excellent for 1910 as the biggest business year in their history.

In that section of his report which referred to the coming show in the Third Regiment Armory, Secretary Beck was particularly enthusiastic. Not only had all the available space for the first week been preempted, but that for the second week (which it had been the original idea to devote almost entirely to an exposition of electrics, commercial vehicles and accessories) was almost gone, the large number of left-overs from the gasoline pleasure class which had been assigned the first week taking up more than half of the second week allotment. An air navigation annex will be a feature of both weeks, while the electric display promises to take on the proportions of a national exhibit, as an arrangement has been entered into with J. C. Bartlett, of the big Woods garage, at a minimum of expense, whereby salesmen and demonstrators will be provided for out-of-town manufacturers who may desire to exhibit their cars, which will be received, taken care of, and shipped home after the show. This scheme has already borne fruit, no less than eight electric concerns having applied for space during the second week.

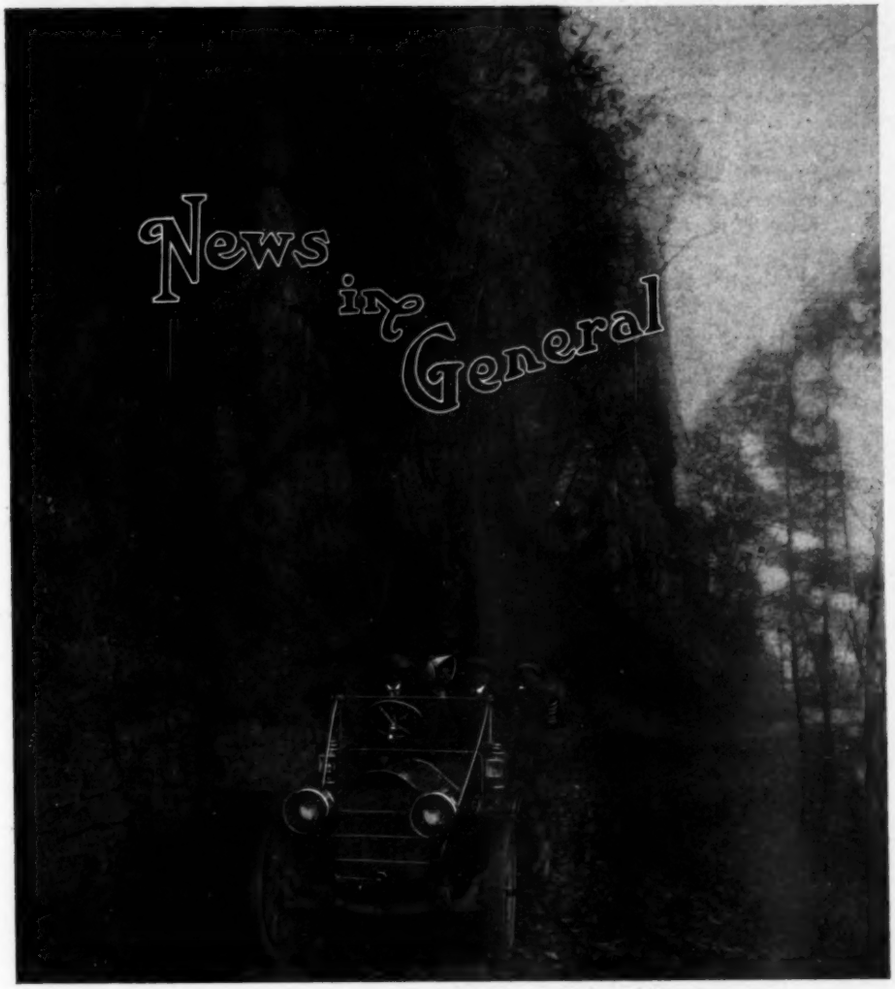
The annual election of the association resulted in the choice of the following officers to serve during the ensuing twelve months: President, J. A. Wister (Elmore); vice-president, H. B. Larzelere (Chadwick); treasurer, W. J. Foss (Pierce-Arrow); board of directors, L. C. Block (Ford), A. E. Maltby (Winton); committee on admissions, Fred C. Browning (Autocar) and F. C. Vanderhoof (Olds-Oakland).

INSURANCE MEN INDORSE AUTO ENGINE

LANSING, MICH., Dec. 6—That the insurance companies would have fire departments equipped with automobile engines if they had their way is shown by the endorsement of the work of the Lansing, Mich., machine by the Michigan Millers' Mutual Fire Insurance Company. The village of Bath, about 10 miles distant from Lansing, was nearly destroyed by fire last week, and would have been entirely wiped out but for the prompt assistance of the Lansing auto engine, which made the run in a few minutes, a feat impossible for an engine drawn by horses. The Millers' Insurance Company was enthusiastic in praise of its work. As insurance companies seldom grow enthusiastic about anything of this nature, it is taken as a huge compliment to the automobile.



Nearly Completed Four-Story Addition to the Plant of the Moline Automobile Company, Moline, Illinois



Along the Face of the Palisades in a Simplex Car

Industry Needs Machinists—Robert Jardine, who is now superintendent of the Royal Tourist Car Company's plant, at Cleveland, says that the greatest need of the automobile industry is a supply of intelligent machinists. The average man now learns to operate but one machine, and as a result, if a man cannot be used on that particular one he is, as a rule, temporarily unavailable. All-round men are badly needed. The trouble seems to be that young men who have passed through the high-school will not enter a plant as apprentices, and with others who have not had that much education the operation of a machine must be learned by rote. Naturally the latter kind are not found very adaptable.

Bergdoll Buys a Blériot—Louis J. Bergdoll, the Philadelphia automobilist, has purchosed a Type XI (cross-Channel) Blériot monoplane, and will attempt flights shortly. He purchased the machine from Rodman Wanamaker, the direct importer, and has had it set up in his garage. Some interesting details are given of the construction of the propeller. It is made by Chauvière, of Paris, 6 feet 10¾ inches in diameter, and weighs but 9.9 pounds, although revolving at a speed of 1600 revolutions. The wood is selected French walnut, laminated, and the laminæ are so arranged that the grain extends from tip to tip. The slip is said to be but 15 per cent.

More Electric Stations—Charging stations at frequent intervals are absolutely necessary to convenient use of an electric car, and the interest taken by electric power plants has greatly helped to popularize this type of motive power. According to O. B. Henderson, of the Baker Motor Vehicle Company, many electric plants are realizing the advantages of supplying current for electrics, and in many cases have completely equipped establishments, with expert attendants. They understand that the automobiles use much more current than curling irons or chafing dishes, and that a moderate patronage will more than pay the expense of providing charging facilities.

Apperson Feats in West—During the past summer Harris Hanshue, of Los Angeles, has driven his Apperson "Jack Rabbit" in eight events on the Pacific Coast, and of these has won five firsts and two seconds. In the 50-mile Ascot race at Los Angeles, in which he was unplaced, a tire blew up and tangled a driving chain, breaking it. He won the 150-mile Ascot race, the Pasadena-Altadena and Redlands hill-climbs, and the heavy car classes at Santa Monica and in the Portola race, at Oakland, Cal. The car is now two years old, having been for one year the property of a private owner in Chicago before being taken to the Coast.

Hartford Likes Its Fords—Two Ford runabouts ordered for the use of the fire chiefs of Hartford, Conn., have just been accepted by the commissioners. President Clark, of the fire board, has given a demonstration at the rate of 48 miles an hour. In the purchase of these two cars the city saved over $1,000, as the appropriation was $3,000 and the Fords cost but $1,997. They went into commission on December 12. The Fords previously used by Chiefs Krug and Loomis have made good in every sense of the term. Chief Krug does not think it is possible to beat his old car, and says that if the new one cannot beat it he will retain the old one.

Baseball Celebrities Converted—To the list of baseball celebrities in the ranks of the automobilists have been added Charles A. Comiskey, president of the Chicago White Sox, and "Hughie" Jennings, manager of the Detroit Tigers. Mr. Comiskey purchased a Studebaker-Garford "40," with a limousine body, from the Chicago Studebaker branch just before leaving for his annual hunt on the Mississippi. The Tiger manager got a Studebaker-E.M.F. "30" in Detroit and drove it to his winter home in Scranton, Pa., where he practises law.

Free Half-Barrels of Oil—The following automobilists are now the recipients of half-barrels of Mobiloil, distributed as the result of an ingenious program scheme at the Vanderbilt: Miss Grace Driggs, New York; J. R. Salmon, Boonton, N. J.; R. C. Warner, East Orange, N. J.; C. J. Allen, Moorestown, N. J.; F. S. Hastings, Richmond Hill, L. I.; B. J. Sjaberg, Elmhurst, L. I.; T. N. Benedict, New Rochelle, N. Y.; C. A. Kochlen, Morris Park, N. Y.; C. A. Baker, Richmond Hill, L. I.; B. H. Harrison, New York.

Rambler Wins At Slow Driving—At times it is fully as important to be able to drive slowly on the high gear as it is to drive fast. In recognition of this, at a recent meet in Texas, a prize was offered by H. T. D. Wilson, of Houston, to the driver making the slowest quarter mile on the high gear. Four cars were entered, of which two were disqualified by their inability to travel slowly on high without killing the engine. A Rambler won the event, taking 4 mins. 35 secs. to cover the distance.

Empire Tire Branch in Philadelphia

Under the management of E. B. Richardson a new branch has been opened in Philadelphia by the Empire Tire Company, Trenton, N. J. The office shown above is located at 322 N. Broad street, where a full line of Empire tires is always kept on hand.

Factory in Springfield, Ill.—The Illinois capital is about to acquire its first automobile factory. This is a 500 by 260-foot building of brick and concrete, with saw-tooth roof, now und r construction for the Springfield Motor Car Company. The car to be built in this factory will be a 40-horsepower, seven-passenger, selling, complete with Bosch magneto, top and lamps, for $2,500. It will have a four-cylinder 5 by 4 3-4-inch motor, 128-inch wheelbase, and tires 36 by 4 front and 36 by 5 rear.

Franklin Family in Vermont—The Proctor family of Vermont, which has for years taken a prominent part in the political and industrial history of that State, owns nine Franklin cars. The first, an 18-horsepower runabout, was purchased in 1906, and was used mostly for trips between the family marble quarries. Recently a 1910 Franklin 18-horsepower runabout was sent for the use of Redfield Proctor, son of the late senator of that name. All of the nine are in steady use.

From the Sunflower State—The Stafford Motor Car Company, of Kansas City, has been organized with a capital stock of $100,000, fully paid up, and will take over the property of the Stafford Motor Car Company, of Topeka, which it succeeds. The plant will be moved to Kansas City about January 15. Terry Stafford continues as president, and the same car will be manufactured. Others interested are C. L. and F. C. Merry, W. G. Whitcomb and C. C. Hoefer.

"Seeley Cure" for Autos—The High-Frequency Ignition Coil Company, of Los Angeles, Cal., which makes the Seeley ignition system, says that this ignition has been adopted by the Columbia Motor Car Company, of Hartford, Conn., for use on its 1910 product. In the Ascot Park races at Los Angeles a Corbin car with Seeley ignition took first in a five-mile and second in a ten-mile.

"Silent Sioux" in Waukesha—The "Silent Sioux," a four-cylinder, 40-horsepower car that was built at Sioux Falls, S. D., last season, will henceforth be made in Waukesha, Wis. The concern, of which R. J. Wells is president, has leased the former plant of the Waukesha Motor Company on North street, and its equipment is now being removed. The output will be increased to ten a month.

"Red Wing" From Minnesota—The Red Wing Boat Mfg. Company, of Red Wing, Minn., has changed its name to the Red Wing Motor Company, and coincidently increased its capital from $50,000 to $250,000. The reorganized company will build automobiles, which, it is said, will be fitted with a modification of the motor formerly built by the company for use in boats.

The Kero-Car from Dayton—Dayton, O., business men are forming the Kero-Car Motor Company to build an automobile driven, as the name indicates, by a kerosene engine. The new engine is said not to be a freak, either in appearance or operation, closely resembling the standard automobile engine. It will burn, however, either gasoline, kerosene or alcohol.

IN AND ABOUT THE AGENCIES

Rushmore Lamps, Berlin, St. Petersburg, Riga and Christiania—The Rushmore Dynamo Works has recently placed agencies in the capitals of Germany and Norway, and in St. Petersburg and Riga, Russia. Branches have also been opened at 1 Crow street, Dublin, and 33 Victoria Building, Deansgate, Manchester, G. B., in addition to the well-established London and Paris branches.

Speedwell and Perry, Philadelphia—Harry L. McCullough has been selected to manage the Continental Motor Car Company, which recently secured the Philadelphia rights for the Speedwell and Parry cars. He is carrying on business from Room 1541 Land Title Building, until repairs are completed on the building at 1416 Vine street, just off the "Row."

Peerless, New York City—The Peerless Motor Car Company announces the opening of new salesrooms and offices at 1760 Broadway, near Fifty-seventh street, New York City. This is the splendid new building of the Peerless branch, which affords a location and facilities unsurpassed in the city.

Everitt "30," Philadelphia—The W. Wayne Davis Company of Philadelphia, distributors and factory representatives of the Metzger Motor Car Company, makers of the Everitt "30," is carrying on business in temporary quarters at 207 North 22d street, pending the securing of a location on the "Row."

Thomas, Philadelphia—Frank J. Fanning, formerly of the Chalmers-Fanning Company, has closed with the E. R. Thomas Motor Company to represent the Thomas Flyer in Philadelphia. Mr. Fanning already has the local right for the Mercer, built in Trenton, N. J.

Simms Magneto, New York City—An American branch of the Simms Manufacturing Company, Ltd., has just been established at 1780 Broadway, New York City, from where the American trade in Simms magnetos will be pushed with characteristic vigor.

Everitt, Detroit—John A. Sibley and W. J. Casterton have organized the Security Auto Company, and will act as Michigan agents for the new Everitt. A garage 60 by 250 feet, on Woodward avenue near Warren, is to be ready by February 15.

Remy Magnetos, San Francisco—The Remy Electric Company has established a branch distributing office in San Francisco, at 170 Golden Gate avenue, where a complete line of magnetos, fittings and parts will be carried in stock.

Continental, Wimbledon, N. D.—The Indiana Motor Sales Company has appointed More Brothers, Wimbledon, N. D., agents for the Continental in North Dakota and part of South Dakota.

Pullman, Birmingham, Ala.—The Pullman Automobile & Supply Company has been organized, and has arranged for a garage at Avenue C and Twenty-first street, where it will handle the Pullman.

Palmer-Singer and Simplex, Kansas City, Mo.—In the future the Palmer-Singer and Simplex cars will be handled in this city by the L. C. M. Motor Car Company, located at 3816 Main street.

Thomas, Boston—C. S. Henshaw, manager of the E. R. Thomas branch in the Hub, has leased a new salesroom at 587 Boylston street, on Copley square, and will take possession December 22.

Velie, Geneva and Oneida, N. Y.—The Kerr-Doane Motor Company, of Syracuse, N. Y., has appointed Baker Brothers, of Geneva, and F. B. Petrie, of Oneida, subagents for the Velie.

Monogram Oil, Boston—The Boston branch of the Columbia Lubricants Company, maker of monogram oil, has removed from 35 Hartford street to new quarters at 1000 Boylston street.

Mason, Shelby, O.—The American Motor and Supply Company, of Shelby, O., has the State agency for the Mason car, and is erecting a fine two-story garage and salesroom building.

Parry, Baltimore—The General Auto Company will be the local representative of the Parry. The firm has its salesroom at 12 West Eager street. Joseph M. Wright is manager.

Austin, Boston—The Austin Company has been established to act as agent for this car, and has established quarters in

the former Kenny-Clark building at 94 Massachusetts avenue.

Howard Rim, Philadelphia—A Philadelphia branch has been opened at 1411 Race street by the Howard Demountable Rim Company, of Trenton, N. J. H. T. Eisenberg is manager.

Continental, Indianapolis—The Reliable Auto Exchange, of Indianapolis, has been appointed Indiana State agent for the Continental, with an allotment of 100 cars.

Marmon, Louisville, Ky.—The Atlas Machine Company, which represents the Empire, has moved to 735 West Market street and assumed the agency for the Marmon.

Overland, Omaha, Neb.—H. H. Van Brunt has obtained quarters on the south side of Farnum street, near Twenty-second, where he will handle the Overland.

Moline, Houston, Tex.—George W. Beardsley, who has a bicycle establishment on Texas avenue, has taken the agency for the Moline.

Demot, Houston, Tex.—The Imperial Motor Car Company, of Houston, has been appointed agent for the Demot in southern Texas.

Corbin, San Francisco—Tracy Holmes has been appointed agent for the Corbin and will open headquarters on Van Ness avenue.

NEW FIRMS IN WINNIPEG

WINNIPEG, MAN., Dec. 8—Two new concerns have entered the automobile field in this city during the past month, and there is every prospect of a further increase before the opening of the 1910 season, as the Regal Motor Car Company is looking over the ground with a view to the establishment of a branch in connection with its Canadian factory, under construction at Walkerville, Ont.

The Central Garage Company has secured a long lease on the modern garage erected by an English syndicate as a speculation. The building has a frontage of 200 feet on two thoroughfares and is 110 feet deep, the construction throughout being brick and steel. The company has secured the local agencies for the Knox, KisselKar and Oakland.

The other company is the firm of McRae & Breen, a reorganization of the carriage firm of A. C. McRae. They will place on the market the Overland, Detroit Electric and a good line of commercial vehicles. General trade prospects in Western Canada have never been better. The number of orders already placed exceeds last season's total.

TOLEDO, O., AGENCIES FOR 1910

TOLEDO, O., Dec. 4—Arrangements have practically been completed by the dealers of this city for their 1910 agencies. The following have been announced: Toledo-Mitchell Company, W. A. Kavanaugh, manager, Mitchell; H. J. Adams, Toledo and Fostoria, O., Babcock Electric; Lichtie Auto Company, Cadillac; Olds-Oakland Company, Oldsmobile and Oakland; Gamble Motor Car Company, Baker, Rauch & Lang and Columbia electrics, and Peerless and Stearns; Patterson & Rault, Rambler; Norris-Toledo Sales Company, Demot, Parry and Velie; Wood-Kessler Company, White steam and gasoline, and Black-Crow; Buick Motor Car Company, F. S. Rockwell, manager, Buick; Regal Motor Car Company, W. S. MacMurray, manager, Regal; Atwood Automobile Company, Overland; Twenty-first Street Garage, Detroit electric and Jackson, Stearns and American; Blevins-Studebaker Automobile Company, Studebaker; Dosson Carriage Company, Paterson, De Tamble and Brush; Union Supply Company, Chalmers-Detroit and Hudson; Roberts-Toledo Auto Company, Ford; Banting Machine Company, Whiting and Grabowsky.

MORE NEW BUILDINGS FOR WILLYS

Toledo, O., Dec. 6—With the mortar hardly dry on one addition, President Willys of the Willys-Overland Company has announced that plans are being made for another, on which work will be started as soon as the weather permits. This new department will be used for the manufacture of commercial cars of both the delivery and truck types. Mr. Willys sees immense possibilities in this line and has determined to enter it as soon as possible. Orders are already being taken for delivery on May 1. Specifications have not yet been published.

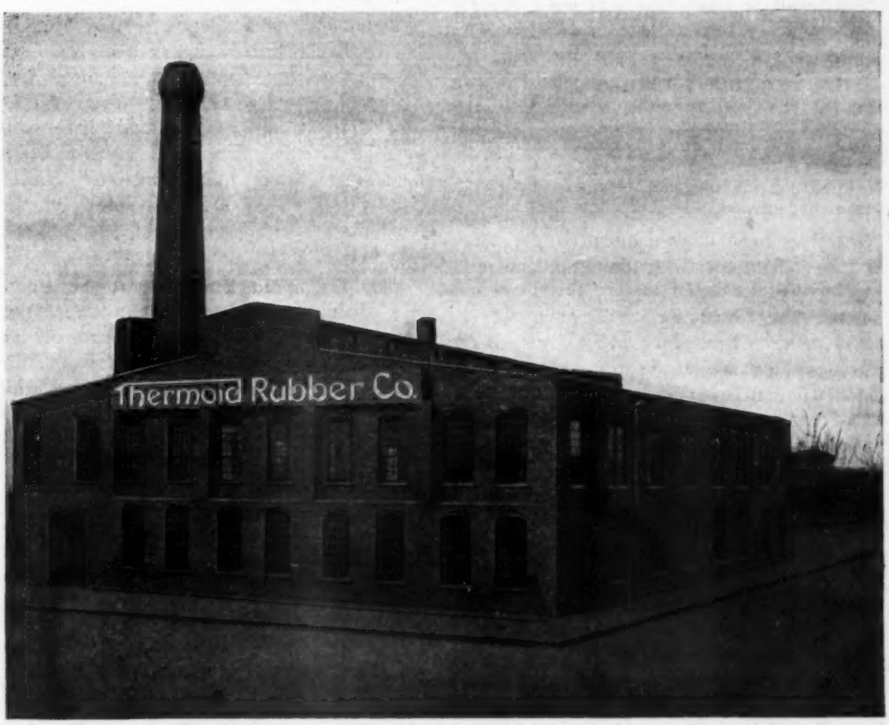
MAXWELL AGENTS IN OHIO

COLUMBUS, O., Dec. 6—The Maxwell-Briscoe Columbus Automobile Company, of which Frank Corbett is manager, has announced a number of sub-agencies in its territory. They are: E. D. Valentine, Springfield; R. W. Ferris, Mt. Vernon; J. B. Griffith, Jackson; J. W. Patton, Marion; W. A. Biddle, Urbana; R. C. Fulton & Company, Athens; Dwyer Brothers, London; O. W. Bonnell, Delaware; Martin & Michael, Washington Court House; Amos Johnson, Wilmot; F. P. Arnold, Cambridge; W. P. Bletzacher, Lancaster; M. A. Ryan, Circleville, and S. Siegrist & Sons, Coshocton.

The company will move shortly into the new salesroom at 58 East Spring street, which will have a space of 40 by 140 feet for salesrooms and a repair shop 50 by 16 ft.

NEW THERMOID RUBBER FACTORY

TRENTON, N. J., Dec. 4—The Thermoid Rubber Company is now occupying its new building, which is devoted entirely to the automobile lines, the manufacture of brake lining, tubing, etc. The building is of brick and steel construction, 120 by 120 feet, and two stories high. The first floor ceiling is 16 feet high, and the second floor 14 feet on the sides, running to 27 feet in the center. The interior walls are painted white and the machinery black. The building is equipped with lockers and lavatories for the workmen.



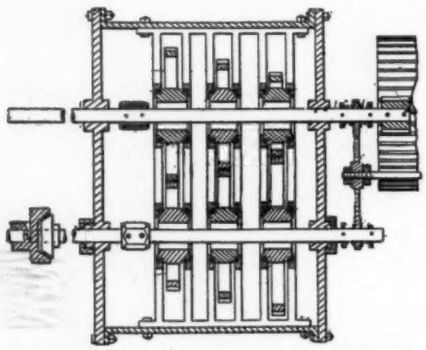
New Brick and Steel Building of the Thermoid Rubber Company at Trenton, N. J.

SOME SELECTED AUTO PATENTS

Issue of August 31, 1909.

932,467. Power Transmitting Device—L. J. Harris, Worcester, Mass. Filed January 10, 1902.

This gear-changing device works, generally speaking, on the individual clutch plan, in which the gears are always in mesh. In all the forms shown in the patent drawings the gearing is of the indirect-on-high type; there are but two solid shafts, the power from the engine being applied to one and the drive to the rear wheels being taken from the other. In addition, the gearing is of the progressive type; the gears must be engaged in their regular order. It will be remembered that the "indirect progressive" was the earliest form of sliding change-gear to be applied to automobile use, and although it has since gone out of fashion, it nevertheless possesses advantages which lead some experts to believe that it will be revived for use on certain classes of vehicles, particularly motor trucks. However, it is probable that the inventor can adapt his gear to the more fashionable direct-drive and selective systems without material modifications.



Harris Individual Clutch Change-Gear

The most noticeable difference from ordinary individual-clutch practice is that the gears not working are not allowed to turn idly. This is accomplished by having the gears on both shafts free, instead of those on one only. Further, it is specified that the gears are actually not in contact with their shafts unless engaged by the clutches. The gears are carried on their own bearings in a separate frame.

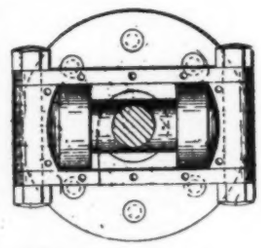
Means of locking the gears to their shafts is provided which has considerable novelty. A hexagonal block of hardened steel is keyed on the shaft. The gears are formed with hexagonal holes through their hubs, adapted to fit the block. By sliding the gears and shaft relatively to each other, the block engages in turn with the hubs of the gears, giving a positive drive. The corners of the block are beveled to guide it into engagement.

The patent covers various combinations of the shafts, gears and hexagonal block, as well as other suitable means, by keys or otherwise, of locking the gears to the shafts as desired. The engaging means, it will be remembered, are provided on both driving and driven shafts. It is possible either to slide the locking devices, the gears remaining stationary, or to slide the frame carrying the gears, the locking devices remaining stationary. The locking devices are suitably cushioned by springs to give smooth action.

Issue of December 7, 1909.

942,087. Universal Joint—Willard C. Lipe, Syracuse, N. Y. Filed November 25, 1905.

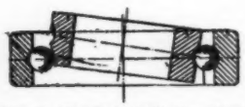
This joint appears to be simpler than many in use at present, and combines both the universal action and the sliding movement necessary to compensate for the variation of distances between centers. It consists of two members to be attached to the two shafts, respectively; two side plates for one of the members and bolts for their attachment. The first member is formed with two projecting arms parallel to its axis, the opposite interior faces of which are formed with concave cylindrically curved surfaces. The two plates mentioned bolt across between the two arms, forming an open-ended socket or rectangular cross-section. The end of the other shaft is formed with a T-head, the ends of the T being suitably rounded and sliding in the concave surfaces of the member on the other shaft. The rotational driving moment is transmitted between the plates which form the sides of the socket and the ends of the T. It is apparent that the device has longitudinal freedom, limited only by the length of the projecting arms of the first member and consequently of the socket.



Lipe Universal Joint

942,392. Ball Bearing—Gustav A. W. Koch, Paris, France. Filed July 14, 1908.

This is a ball bearing of the annular type, and the patent covers especially the method of assembling the same with the balls in place. The bearing is presumably of the "full" type. The patent calls for a ball bearing in which one of the rings forming the races is provided with an "eccentric frusto-conical surface" at one side of the raceway to facilitate forcing that ring into its proper relation to the other ring with the balls in place. An additional claim covers "a confining ring for a ball bearing having a concave circular race-way, and a marginal surface on one side of said race-way whose surface is inclined to the cylindrical, the angle of said inclination varying continuously from a certain minimum to a certain maximum."

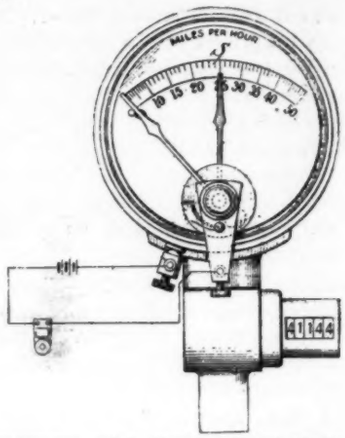


Koch Radial Ball Bearing

942,497. Speedometer Attachment—William R. Harris, Irvington-on-the-Hudson, N. Y. Filed July 28, 1908.

A new field for the inventor's talent has been opened up by the demand in some quarters that automobiles be provided with a device that will show when a certain legal maximum speed is being exceeded. Several devices of this nature have been brought out in England, but this is the first which has come to notice in this country.

The speedometer itself may apparently be of any ordinary type. It is provided with a second hand, like the "maximum" hand recently brought out, which may be adjusted to any desired position on the scale. This hand carries an electric contact piece connected to one side of a circuit. The speedometer indicating hand carries a similar contact adapted to touch that of the extra hand whenever the figure indicated by the latter is reached or exceeded. The electric circuit of course is provided with a suitable alarm bell which rings when the contact is made.



Speedometer with Harris Speed-Limit Bell

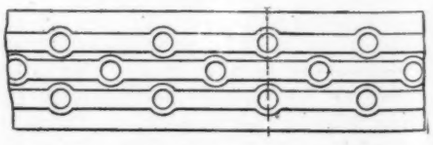
942,567. Automobile Tire—Iva B. Kempshall, Boston, Mass. Filed August 13, 1909.

Anti-skid tires are another fruitful field for inventors. This tire is one which has been on the market with considerable success. The patent covers the shape and arrangement of projections on the face of the tire. These are specified as a "series of continuous longitudinal ribs, each of which presents continuous edges around the tire, and is formed with a series of pockets" and a series of continuous longitudinal ribs presenting continuous edges extending around the tire, each of the ribs being formed with a series of enlargements forming protuberances on said edges. These two claims, although embodied in the same patent, seem to cover quite different and distinct ideas in tire construction, as the former, with its "series of pockets" should have a sucking action on the road surface quite different from the effect of the protuberances in the other claim.

Jeffery Non-Sooting Plug

942,646. Electric Igniting Device—Joseph A. and Benjamin A. Jeffery, San Francisco. Filed August 15, 1906.

Although disguised as an "electrical igniting device," this is really only a spark-plug, with an ingenious means for preventing fouling. The claim is for an "electric sparking device with separated terminals, the exposed area of either of said terminals being restricted to a limit where the proximity or surface contact therewith of a medium of lesser conductivity will be insufficient to carry the current without heating such medium to the point of disintegration." In other words, the electric current passing between the points is so concentrated that the "medium of lesser conductivity," that is, the soot or carbon, is simply burned away before it can have any injurious effect. The patent appears to cover some forms of spark-plugs which are at present on the market, although the anti-fouling device is both new and ingenious.

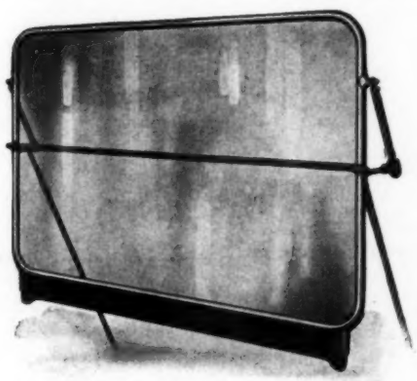


Kempshall Anti-Skid Tire with Ribs

Information for Auto Users

Bi-Motor Wind Shields—These shields manufactured by the Bi-Motor Equipment Company, 177 Portland street, Boston, are in several styles, known under the trade names of the "Boston," the "Hartford" and the "Lincoln." The "Boston" is folding and adjustable. It has no cams, springs or catches, and can be placed in any position with one hand. It cannot be broken by slamming, as it stays in any position in which it is placed. The resistance is adjustable, either for wear or to suit the individual taste. The frame is of 7-8-inch seamless brass tubing, and the glasses are genuine French plate.

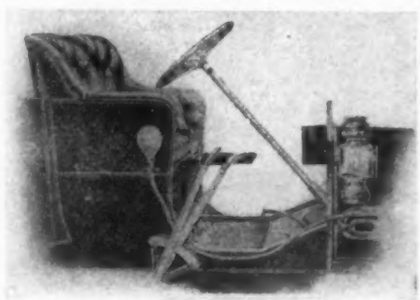
The "Hartford" is a drop shield, and is particularly adapted to cars which have the steering wheel so near the dash that there is not room for a hinged shield to swing. The upper glass moves up and down in a vertical position close to the



BI-MOTOR WIND SHIELD, "BOSTON" STYLE

stationary glass. It is made of the same materials as the "Boston" and sells at the same price. The "Lincoln" is a cheaper shield, of the folding type. Its mechanism is different from the "Boston," involving the use of set screws to hold the swinging glass in the desired position. The materials are the same as in the other shields, the lower price being due to the less expensive mechanism. All three shields are made either 36, 39 or 42 inches wide, with 5, 8 or 10-inch mahogany filler boards. Special attention is paid to packing for shipment, to insure reaching the purchaser in good condition.

"Out-o-Site" Seat.—The McKinnon Dash Company, of Buffalo, N. Y., has brought out a simple and inexpensive folding seat with which the capacity of an automobile can be increased in an emergency. It is intended principally for children, although strong enough to support the weight of an adult if necessary. The cut shows it attached between the two front seats, a position which, of course, would be impractical unless the occupant was small enough not to encroach on the driver's elbow



"OUT-O-SITE" SEAT ON A CADILLAC CAR

room. It can also be used in the tonneau, back to back with the front seat, or on the inside of the tonneau doors. It folds flat into the thickness of its own cushion, so would not obstruct the opening of the doors in this position.

The seat consists of a light frame of round steel, handsomely oxidized, which is attached to the framework of the body by four screws, and the seat cushion, also with a steel frame, upholstered in imitation leather. There are no diagonal struts. The seat when open is held in a horizontal position by hook-like extensions of the cushion frame. To close, the cushion is swung up vertically and then dropped down into the supporting frame.

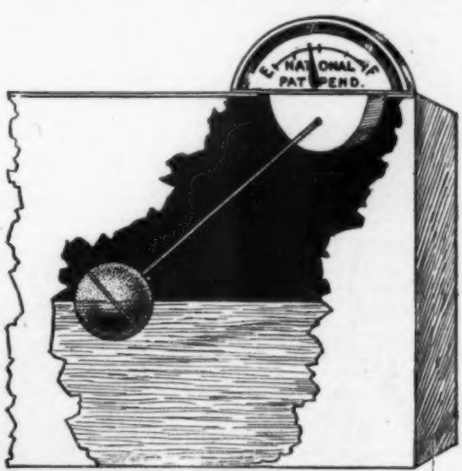
1910 Gabriel Horns—The Gabriel Horn Manufacturing Company, of Cleveland, will continue to manufacture its horns which have given such satisfactory service in the past. In the 1910 models, however, the two lower notes will be operated together, making a perfect chord, which, in combination with the high note, two octaves above, produces a singularly sweet musical effect and also gives great carrying power. The sizes and weights are as follows: No. 2 horn, 2 1-2-inch tube, 30 inches long; weight, 4 pounds; No. 3 horn, 3-inch tube, 32 inches long; weight, 5 1-2 pounds; No. 4 horn, 3 1-2-inch tube; weight, 6 1-2 pounds.

The 1910 valve is the same as formerly except that the lever is made from 3-8-inch stock, and the screws which fasten on the discs are better placed, so as to greatly increase the strength. The valves are made in sizes to fit 3-4 to 3-inch steel tubing and 1 to 2-inch iron pipe. The valve can be used for a muffler cut-out by removing the disc in the main channel.

The Gabriel trumpet is another novelty which this company has recently placed on the market, and which has proved very popular. It consists of four single tubes with a valve on each controlling the tube individually. These are operated by a keyboard carrying four keys. All the ordinary bugle calls can be played on this instrument. The keyboard is also fitted with a small lever which opens all four valves, thereby giving a perfect chord for signalling purposes simply on pressing the foot pedal.

"National" Gasoline Gauge.—For simplicity this gauge will certainly take the prize. It has but one moving part, a bent wire, pivoted, one end of which carries a float and the other the gauge pointer. There are no gears, springs, pulleys, or anything else that could get out of order or stick. The float is of spun brass. The dial is an arc of about 90 degrees, and reads from the side. This makes it easy to see while filling the tank, and at the same time protects the glass from breakage. The dial projects only three-quarters of an inch, so that it will go on almost all tanks under the seat. The gauge body is of brass, nickel plated, and is dust-proof.

Another good feature of this gauge is that it can be adapted to any depth of tank up to 12 inches simply by lengthening or shortening the wire which carries the float. The length of wire for a given depth is specified by the maker. This



FEW PARTS IN THE "NATIONAL" GAUGE

makes easy work for dealers, who do not have to carry in stock different sizes for different tanks. The "National" gauge is made by the National Motor Supply Company, Cleveland, and sells for a very reasonable price.

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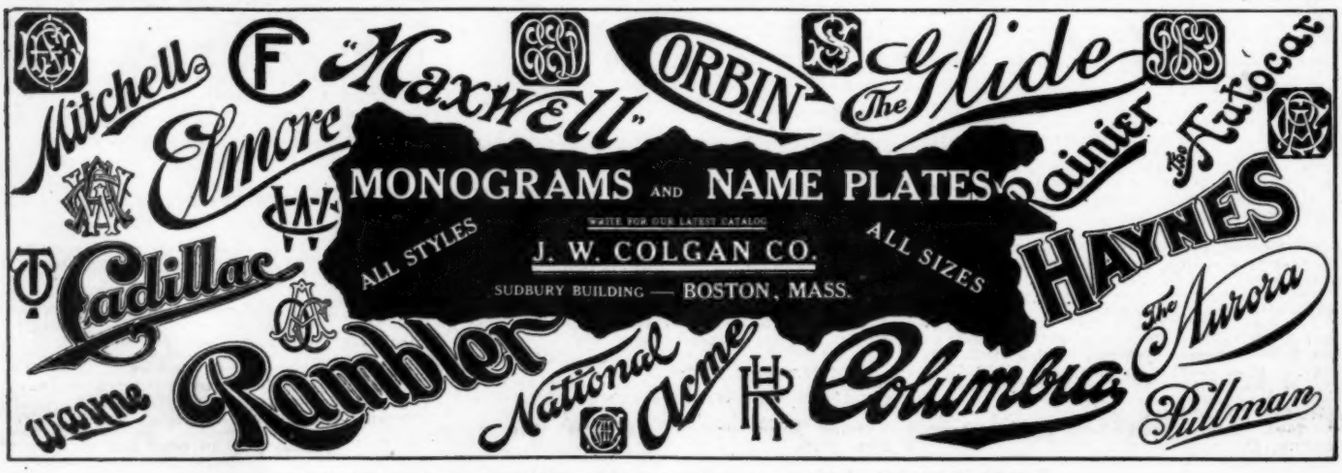
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